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Supplementary Materials

Study of the Resonance Structures of the Preionizing Spectrum of Molecular Hydrogen by Phase-Shifted Multichannel Quantum Defect Theory II

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for "Study of the Resonance Structures of The Preionizing Spectrum of Molecular Hydrogen by Phase-Shifted Multichannel Quantum Defect Theory II"

Phase-shifted QDT parameters

System. The rotational preionizing system of H_2 in the region above its H_2^+ ionization threshold, ($^2\Sigma_g^+, v^+ = 0, N^+ = 0$) converging toward its rotationally excited ($v^+ = 0, N^+ = 2$) limit and perturbed by the vibrationally excited levels 7pπ $v = 1$ and 5pπ $v = 2$.

Phase-shifted QDT parameters

D: Ihe transition dipole moments (a.u.)
I : Ionization energies (cm^{-1})
mu : phase-shifts
K: Phase-shifted reactance matrix

The order of channel labelling used : [open, closed channels …] (refer to the corresponding ionization energies)

the number of interloper channels: 0

```
D = [    0.58339     -0.020629    ];
I = [124417.3000    124591.5453 ];
mu= [ -0.00305    0.12327   ];
K = [0      -0.43752
    -0.43752    0   ];
```

the number of interloper channels: 1

```
D = [    0.58654      -0.03172         0.7661    ];
I = [124417.3000    124591.5453 126608.6421 ];
mu= [ -0.00298    0.12271     0.03843   ];
K = [0      -0.43703      -0.033748
    -0.43703    0        0.11989
   -0.033748         0.11989    0   ];
```

the number of interloper channels: 2

```
D = [    0.58398     -0.021085        0.76717      -0.022274    ];
I = [124417.3000    124591.5453 126608.6421 126773.7112 ];
mu= [ -0.00370    0.12109    -0.00506     0.15772   ];
K = [0      -0.43256      -0.012751       0.079152
    -0.43256    0      0.088966       -0.11767
   -0.012751       0.088966    0      -0.50452
    0.079152       -0.11767       -0.50452    0   ];
```

the number of interloper channels: 3

```
D = [    0.58419     -0.022366        0.77882       -0.06176
0.77529    ];
I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527 ];
mu= [ -0.00369    0.12113    -0.00443     0.15414     0.07817   ];
K = [0      -0.43267      -0.013213       0.079194      -0.0010927
    -0.43267     1.0592e-010       0.089724        -0.1179
0.0061017
   -0.013213       0.089724    0      -0.50147      -0.059297
    0.079194        -0.1179       -0.50147    0       0.20712
  -0.0010927      0.0061017      -0.059297        0.20712     1.4937e-
010    ];
```

the number of interloper channels: 4

```
D = [    0.58405     -0.020518        0.76826      -0.019631
0.79253       -0.03881    ];
I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 ];
mu= [ -0.00368    0.12123    -0.00614     0.14805    -0.01958
0.22923   ];
K = [0      -0.43284      -0.014546       0.080219      0.0023633
0.0060107
    -0.43284    0      0.090918       -0.11809      0.0049912     -
0.0016852
   -0.014546       0.090918    0      -0.48592     -0.0041747
0.11384
    0.080219       -0.11809       -0.48592    0       0.11341       -
0.19717
```

```
         0.0023633      0.0049912     -0.0041747        0.11341    0      -
0.60211
         0.0060107     -0.0016852        0.11384       -0.19717       -
0.60211    0   ];
```

the number of interloper channels: 5

```
       D = [     0.58548     -0.023162        0.76784       -0.02188
0.85657       -0.20924        0.54563    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 ];
       mu= [ -0.00368    0.12120    -0.00592    0.14956    -0.00757
0.18419    0.23797   ];
       K = [0      -0.43279      -0.014265       0.080038        0.00146
0.0072141     -0.0029713
          -0.43279    0      0.090619       -0.11803      0.0057468     -
0.0033609      0.0048111
         -0.014265       0.090619    0      -0.48904      -0.013587
0.11412     0.00030038
          0.080038       -0.11803       -0.48904    0       0.13009       -
0.19592     -0.00059558
           0.00146      0.0057468      -0.013587        0.13009    0      -
0.56526       -0.12192
         0.0072141     -0.0033609        0.11412       -0.19592       -
0.56526    0       0.37203
        -0.0029713      0.0048111     0.00030038    -0.00059558       -
0.12192        0.37203    0   ];
```

the number of interloper channels: 6

```
       D = [     0.58418     -0.020524        0.76964      -0.018667
0.80773      -0.019266       -0.70134       -0.16145    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 ];
       mu= [ -0.00368    0.12119    -0.00587    0.15010    -0.01120
0.17044    -1.10346     0.42296   ];
       K = [0      -0.43276      -0.014188       0.079939      0.00077473
0.008003     -0.00073527       0.0024671
          -0.43276    0      0.090539       -0.11794      0.0063245     -
0.0039048     -0.00077081      -0.0033752
         -0.014188       0.090539    0      -0.49008      -0.017406
0.11708      -0.0080807       0.0012791
          0.079939       -0.11794       -0.49008    0        0.1329       -
0.19286      -0.0085573       0.0061516
         0.00077473      0.0063245      -0.017406        0.1329    0      -
0.52462       -0.049132        0.11877
          0.008003     -0.0039048        0.11708       -0.19286       -
0.52462    0      -0.034662       -0.27477
        -0.00073527     -0.00077081      -0.0080807     -0.0085573       -
0.049132       -0.034662    -1.1423e-010        0.67869
          0.0024671      -0.0033752       0.0012791       0.0061516
0.11877       -0.27477        0.67869    -1.3511e-010    ];
```

the number of interloper channels: 7

```
       D = [     0.58445     -0.021095        0.77176      -0.026522
0.79177      -0.0097286       -0.85038        0.32932         0.2531    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
```

```
128828.9571 130613.8564 130761.4641 132435.5133 ];
       mu= [ -0.00368    0.12120    -0.00597    0.14943    -0.01264
0.18753    0.98944    -0.80005    0.37256   ];
       K = [0     -0.43279      -0.014322       0.080049      0.0012697
0.0073741       0.001028     -0.0041171    -0.00075988
          -0.43279    0      0.090683       -0.11803      0.0058615      -
0.003171     -0.0029136      0.0048392     0.00083622
         -0.014322       0.090683    0       -0.48873      -0.013857
0.1161     -0.0030726      -0.012987     -0.0062634
          0.080049       -0.11803       -0.48873    0       0.12768        -
0.194       -0.01088      0.0062138       0.010093
         0.0012697      0.0058615      -0.013857        0.12768    -2.4497e-
009       -0.55011       0.010099       -0.13527      0.0052137
         0.0073741      -0.003171         0.1161         -0.194       -
0.55011    -1.2511e-008       -0.16852        0.28297      -0.025101
          0.001028     -0.0029136     -0.0030726       -0.01088
0.010099       -0.16852    -1.8815e-008       -0.60741        0.18065
        -0.0041171      0.0048392      -0.012987      0.0062138       -
0.13527        0.28297       -0.60741     1.8215e-008       -0.51478
       -0.00075988     0.00083622     -0.0062634       0.010093
0.0052137      -0.025101        0.18065       -0.51478    -2.2747e-008    ];
```

the number of interloper channels: 8

```
       D = [     0.58906     -0.026977        0.77957      -0.020081
1.0165       -0.37307      -0.056236         1.2985        0.61819       -
0.60248    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 ];
       mu= [ -0.00369    0.12116    -0.00563    0.15114    -0.00113
0.13461    -0.51987    -0.29054    -0.12122    0.45458   ];
       K = [0     -0.43271      -0.013951       0.079842     9.934e-005
0.0090552      0.0066373     -0.0014416     0.00058485       0.001802
          -0.43271    0      0.090313       -0.11794      0.0072616      -
0.0058627     -0.0080307      0.0047661     -0.00028233     -0.0031242
         -0.013951       0.090313    0       -0.49224      -0.022991
0.11631       0.014702      0.0097369      0.0031026       0.002893
          0.079842       -0.11794       -0.49224    0       0.14715        -
0.19575      0.0043863       0.010535      0.0013239      -0.010128
        9.934e-005      0.0072616      -0.022991        0.14715    0       -
0.4982        0.28661       -0.041383       0.028185       0.043403
         0.0090552     -0.0058627        0.11631       -0.19575        -
0.4982    0       -0.47836        0.27646       -0.012193       -0.13364
         0.0066373     -0.0080307       0.014702      0.0043863
0.28661       -0.47836    0        1.7169        0.01813       -0.58257
        -0.0014416      0.0047661      0.0097369       0.010535       -
0.041383        0.27646         1.7169    0       0.11011        0.19496
        0.00058485    -0.00028233      0.0031026      0.0013239
0.028185      -0.012193        0.01813        0.11011    0      -0.68921
          0.001802     -0.0031242       0.002893      -0.010128
0.043403       -0.13364       -0.58257        0.19496       -0.68921    0   ];
```

the number of interloper channels: 9

```
       D = [      0.5843     -0.020879        0.76946      -0.021142
0.80237       -0.028032       -0.75257      -0.041067        0.67099       -
0.36076        0.36832    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
```

```
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556 ];
       mu= [ -0.00368    0.12120    -0.00598     0.14952    -0.01259
0.18561    -1.02447     0.22380    -0.05799     0.31760     0.26656   ];
       K = [0     -0.43278      -0.014315       0.080044      0.0011767
0.0074669     0.00090842      0.0041547    -9.5542e-005      0.0013189    -
0.00082598
          -0.43278    0      0.090674       -0.11802      0.0059522     -
0.0032777     -0.0027147     -0.0047613      0.0004686     -0.0014672
0.0010161
         -0.014315       0.090674    0      -0.48885       -0.01449
0.11634     -0.0031855        0.01302    8.7379e-005        0.00776     -
0.0032749
          0.080044       -0.11802       -0.48885    0       0.12855       -
0.19404      -0.010589     -0.0045286      0.0037799     -0.0099579
0.0035592
         0.0011767      0.0059522       -0.01449        0.12855    0      -
0.54709      0.0067001        0.14305       0.010157       0.013135      -
0.014829
         0.0074669     -0.0032777        0.11634       -0.19404       -
0.54709    0       -0.1531       -0.28288       0.013477     -0.0029854
0.022426
        0.00090842     -0.0027147     -0.0031855      -0.010589
0.0067001        -0.1531    -2.3839e-010        0.59323      -0.028542
-0.14331       0.022326
         0.0041547     -0.0047613        0.01302     -0.0045286
0.14305       -0.28288        0.59323    0       0.11957       -0.41016
0.040333
       -9.5542e-005      0.0004686    8.7379e-005      0.0037799
0.010157       0.013477      -0.028542        0.11957    -1.9539e-010       -
0.70024      -0.063729
         0.0013189     -0.0014672        0.00776     -0.0099579
0.013135     -0.0029854       -0.14331       -0.41016       -0.70024    0
0.6778
       -0.00082598      0.0010161     -0.0032749      0.0035592      -
0.014829       0.022426       0.022326       0.040333      -0.063729
0.6778    0   ];
```

the number of interloper channels: 10

```
       D = [    0.58585     -0.022924        0.77819      -0.036323
0.80361      -0.027269        0.98757        0.54861       -0.58448        -
1.1471        0.80638        0.85301    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 ];
       mu= [ -0.00368    0.12121    -0.00598     0.14929    -0.01259
0.19035    -0.00084    -0.84476    -0.52323     0.74489     0.40904    -
0.11629   ];
       K = [0     -0.43279      -0.014346       0.080073      0.0013886
0.0072339     -0.0015097     -0.0045733      0.0017659     0.00029112
-0.001284     0.00012266
          -0.43279    0      0.090713       -0.11805      0.0057578     -
0.0030243      0.0034939      0.0053588     -0.0019811     -0.0008716
0.0018142    8.2538e-005
         -0.014346       0.090713    0      -0.48847      -0.013044
0.11566      0.0010093      -0.015825       0.010993      0.0012415     -
0.0057051      0.0008878
          0.080073       -0.11805       -0.48847    0       0.12668       -
0.19393       0.013172       0.010212      -0.015166     -0.0080789
```

```
0.010486      0.0007871
         0.0013886      0.0057578      -0.013044        0.12668    0       -
0.5551      -0.019866       -0.13661      0.0091739      -0.018996     -
0.0051007      0.0060338
         0.0072339     -0.0030243        0.11566       -0.19393        -
0.5551    0       0.19116        0.28168       0.019901     -0.0068469
0.021992      0.0073846
        -0.0015097      0.0034939      0.0010093       0.013172      -
0.019866        0.19116    0       0.55523        0.29853       0.027826
-0.093177       0.038645
        -0.0045733      0.0053588      -0.015825       0.010212       -
0.13661        0.28168        0.55523    0       0.59746        0.28092
-0.28286      -0.013586
         0.0017659     -0.0019811       0.010993      -0.015166
0.0091739       0.019901        0.29853        0.59746    0       -1.4851
0.98843        0.15332
        0.00029112     -0.0008716      0.0012415     -0.0080789      -
0.018996     -0.0068469       0.027826        0.28092        -1.4851    0
0.33162       -0.10601
         -0.001284      0.0018142     -0.0057051       0.010486     -
0.0051007       0.021992      -0.093177       -0.28286        0.98843
0.33162    0       -1.4039
        0.00012266     8.2538e-005      0.0008878      0.0007871
0.0060338      0.0073846       0.038645      -0.013586        0.15332
-0.10601        -1.4039    0   ];
```

the number of interloper channels: 11

```
       D = [     0.58586      -0.02293        0.77823      -0.036389
0.80366      -0.027399         0.9883         0.5502        -0.5867        -
1.1484         0.81243        0.85474        0.85907    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 ];
       mu= [ -0.00368    0.12121    -0.00598     0.14929    -0.01259
0.19036    -0.00082    -0.84491    -0.52300     0.74431     0.41000    -0.11824
0.00951   ];
       K = [0      -0.43279       -0.014346        0.080073       0.0013889
0.0072334      -0.0015116      -0.0045751       0.0017682      0.00029359      -
0.0012869      0.00011715    -8.0584e-005
          -0.43279    0       0.090713       -0.11805       0.0057574      -
0.0030237       0.0034962       0.0053609      -0.0019834    -0.00087482
0.0018162     9.0246e-005       0.0001588
          -0.014346       0.090713    0       -0.48847       -0.013042
0.11566       0.0010008       -0.015837        0.011007       0.0012559      -
0.0057312        0.000864     -0.00083836
           0.080073       -0.11805       -0.48847    0       0.12668        -
0.19393        0.013182        0.010229       -0.015182     -0.0081034
0.010519      0.00082987       0.0022165
          0.0013889       0.0057574       -0.013042        0.12668    -3.4948e-
010       -0.55512        -0.0199       -0.13662       0.0092097       -
0.019003      -0.0051506       0.0060154      0.00015028
          0.0072334      -0.0030237        0.11566       -0.19393        -
0.55512    2.2013e-010        0.19123        0.28169       0.019899       -
0.006811        0.021997       0.0074571       0.0077137
         -0.0015116       0.0034962       0.0010008       0.013182        -
0.0199        0.19123     1.8294e-009        0.55503        0.29893
0.028284       -0.093836       0.038213      -0.0037631
         -0.0045751       0.0053609       -0.015837       0.010229       -
```

```
0.13662        0.28169        0.55503    -3.8556e-010        0.59775
0.28182       -0.28383      -0.014793      -0.052626
         0.0017682     -0.0019834       0.011007      -0.015182
0.0092097       0.019899        0.29893        0.59775    2.8091e-008
-1.486        0.98853        0.15746        0.15256
         0.00029359    -0.00087482      0.0012559     -0.0081034      -
0.019003      -0.006811       0.028284        0.28182         -1.486    -
2.6003e-008        0.33316       -0.10437      -0.024232
         -0.0012869      0.0018162     -0.0057312       0.010519     -
0.0051506       0.021997      -0.093836       -0.28383        0.98853
0.33316    7.5254e-009        -1.4028       -0.53738
         0.00011715    9.0246e-005       0.000864     0.00082987
0.0060154      0.0074571       0.038213      -0.014793        0.15746
-0.10437        -1.4028    -7.6145e-009       0.076915
       -8.0584e-005      0.0001588    -0.00083836      0.0022165
0.00015028      0.0077137     -0.0037631      -0.052626        0.15256
-0.024232       -0.53738       0.076915    -1.4346e-008    ];
```

the number of interloper channels: 12

```
       D = [     0.58347     -0.019841         0.7662      -0.017436
0.78923      -0.010237       -0.72583       0.024489        0.64764
0.22599         1.0972       -0.76508       -0.14774        0.55337    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 ];
       mu= [ -0.00368    0.12121    -0.00597     0.14943    -0.01289
0.18714    -1.01929     0.21086    -0.09878     0.40008    -0.02920    -0.04767
0.53598    -0.25751   ];
       K = [0      -0.43279      -0.014327       0.080049      0.0012308
0.0073987      0.0010285       0.004188     9.559e-005     0.00095685     -
0.0006154     0.00081268     0.0010448     0.00075429
          -0.43279    -2.9895e-006       0.090687       -0.11802
0.0059048     -0.0032062     -0.0028512     -0.0047686     0.00025783
-0.001112     0.00069134    -0.00072505     -0.0012957    -0.00084042
         -0.014327       0.090687    -2.421e-005       -0.48875      -
0.014078        0.11612     -0.0026938        0.01349      0.0012495
0.0055165     -0.0037604      0.0052363      0.0040324       0.003001
          0.080049       -0.11802       -0.48875     0.00010268
0.12796       -0.19396      -0.010998     -0.0050694      0.0022553     -
0.0075343      0.0050702     -0.0056772     -0.0042387     -0.0026462
         0.0012308      0.0059048      -0.014078        0.12796
0.00051969       -0.54902      0.0093962         0.1417        0.01183
0.0035097      -0.011506       0.018946       0.015731       0.012439
         0.0073987     -0.0032062        0.11612       -0.19396       -
0.54902     -0.0012022       -0.15892       -0.27878       0.013573
0.011404       0.019866      -0.021489      -0.017547      -0.011078
         0.0010285     -0.0028512     -0.0026938      -0.010998
0.0093962       -0.15892     -0.0056954         0.5825      -0.050756
-0.1325       0.036229      -0.068755      -0.049274      -0.040936
          0.004188     -0.0047686        0.01349     -0.0050694
0.1417       -0.27878         0.5825       0.005249       0.051144       -
0.35917        0.11792       -0.12194      -0.083484      -0.046554
         9.559e-005     0.00025783      0.0012495      0.0022553
0.01183       0.013573      -0.050756       0.051144      0.0039992       -
0.67879       0.075544     -0.0013626      -0.040271       0.019237
         0.00095685      -0.001112      0.0055165     -0.0075343
0.0035097       0.011404       -0.1325       -0.35917       -0.67879      -
0.007372        0.36937       -0.42165       -0.72501       -0.47851
```

```
         -0.0006154      0.00069134      -0.0037604       0.0050702       -
0.011506        0.019866        0.036229         0.11792        0.075544
0.36937        0.011547        -0.26982         -1.1183        -0.66742
         0.00081268     -0.00072505       0.0052363      -0.0056772
0.018946       -0.021489       -0.068755        -0.12194      -0.0013626        -
0.42165        -0.26982         0.10532          1.6026         1.1063
          0.0010448      -0.0012957       0.0040324      -0.0042387
0.015731       -0.017547       -0.049274       -0.083484       -0.040271        -
0.72501         -1.1183          1.6026        0.063597         -1.2512
         0.00075429     -0.00084042        0.003001      -0.0026462
0.012439       -0.011078       -0.040936       -0.046554        0.019237        -
0.47851        -0.66742         1.1063         -1.2512        -0.22289    ];
```

the number of interloper channels: 13

```
       D = [     0.58436      -0.020951         0.76944       -0.020893
0.80392       -0.030995        -0.74556       -0.018164         0.76979        -
0.41414         0.11842         0.80313         0.78321        -0.55888
0.44488    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 137209.9028 ];
       mu= [ -0.00368    0.12120    -0.00597     0.14956    -0.01255
0.18462    -1.02737     0.23582    -0.02587     0.24708     0.37574    -0.04983
0.00521     0.17571    -0.24808   ];
       K = [0      -0.43278       -0.014308        0.080038       0.0011421
0.0075165      0.00077045       0.0040347     -0.00036468       0.0015502     -
0.00075187      0.00011034    -6.8621e-006       0.0001528     7.3575e-005
          -0.43278    0       0.090665        -0.11802       0.0059835      -
0.0033334      -0.0025603      -0.0046461      0.00077495      -0.0017193
0.00088915      3.987e-005     2.7558e-005     -0.00010278     -9.444e-005
          -0.014308        0.090665    0       -0.48893       -0.014734
0.11649      -0.0037663        0.012207       -0.001342       0.0086479      -
0.0027153      0.00053852     -0.00052474       0.0015611       -0.000125
           0.080038        -0.11802        -0.48893    0        0.12887        -
0.19409       -0.010105       -0.003601       0.0055048       -0.010477
0.0024373      0.00078749       0.0011977      -0.0021443      0.00050483
          0.0011421       0.0059835       -0.014734        0.12887    0       -
0.54547       0.0032967        0.14215        0.006315        0.019537       -
0.015936       0.0047661     -0.00099982       0.0053952      0.00031106
          0.0075165      -0.0033334        0.11649       -0.19409        -
0.54547    0       -0.14659        -0.28349         0.01734       -0.012019
0.02437       0.0042147       0.0056469       -0.011043       0.0016149
         0.00077045      -0.0025603      -0.0037663       -0.010105
0.0032967        -0.14659    0        0.60602       -0.010422        -0.13873
0.01041       -0.026265      -0.0021569      -0.0080319      -0.0018893
          0.0040347      -0.0046461        0.012207       -0.003601
0.14215        -0.28349         0.60602    0        0.18313        -0.40532
-0.020821        0.031026        0.030367       -0.042579        0.016319
        -0.00036468      0.00077495       -0.001342       0.0055048
0.006315         0.01734       -0.010422         0.18313    0       -0.66953
-0.21277         0.10557         0.037979       0.0078613        0.025287
          0.0015502      -0.0017193       0.0086479       -0.010477
0.019537       -0.012019        -0.13873        -0.40532        -0.66953    0
0.7378       -0.002167        0.036861        -0.11563      -0.0015179
        -0.00075187      0.00088915      -0.0027153       0.0024373       -
0.015936         0.02437         0.01041       -0.020821        -0.21277
0.7378    0        -1.4982        -0.44052         0.79511        -0.32266
         0.00011034      3.987e-005      0.00053852      0.00078749
```

```
0.0047661      0.0042147      -0.026265       0.031026       0.10557      -
0.002167       -1.4982    0       0.15831      -0.087141       0.081808
      -6.8621e-006    2.7558e-005    -0.00052474      0.0011977    -
0.00099982      0.0056469     -0.0021569       0.030367       0.037979
0.036861       -0.44052       0.15831    0      -0.64968       0.30054
         0.0001528    -0.00010278      0.0015611     -0.0021443
0.0053952      -0.011043     -0.0080319      -0.042579      0.0078613
-0.11563       0.79511      -0.087141       -0.64968    0      -0.54808
       7.3575e-005    -9.444e-005      -0.000125     0.00050483
0.00031106      0.0016149     -0.0018893       0.016319       0.025287     -
0.0015179       -0.32266       0.081808       0.30054       -0.54808
0   ];
```

the number of interloper channels: 14

```
      D = [     0.58614     -0.023056       0.78081      -0.039161
0.80921       -0.02525          1.062       -0.62342       0.55731
1.3197        0.64858         1.3121        0.38798       0.26792
1.3182        -1.8497    ];
      I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 137209.9028 137324.8899 ];
      mu= [ -0.00368    0.12121    -0.00598     0.14924    -0.01263
0.19132     0.00038     0.14199     0.48863    -0.29433     0.47929    -0.29024
-0.14427    -0.25175    -0.04160     0.14988   ];
      K = [0     -0.43279      -0.014355       0.080081       0.001424
0.0071856     -0.0016913       0.004742     -0.0019674    -0.00048335     -
0.0015116     -0.0004312    8.6835e-005    2.7384e-006    -0.00045016
0.0010803
          -0.43279    0      0.090724       -0.11806      0.0057275     -
0.0029678       0.003707     -0.0055285       0.0021143      0.0011142
0.001846     0.00080805    -2.9279e-005    2.4462e-006     0.00058752     -
0.0013332
         -0.014355       0.090724    0      -0.48837      -0.012792
0.11553     0.00013668       0.016976      -0.012601     -0.0025095     -
0.0082763     -0.0021597     0.00074177    -0.00049272     -0.0033385
0.0074792
          0.080081       -0.11806       -0.48837    0       0.12636       -
0.1939       0.014235      -0.011788       0.016961       0.010336
0.013229      0.0061788    -0.00075787      0.0012881      0.0064391      -
0.013528
          0.001424      0.0057275      -0.012792       0.12636    0      -
0.55661      -0.023123       0.13809      -0.012595       0.019527     -
0.010605      0.0035518      0.0015096     0.00077762     -0.0024013
0.0067173
         0.0071856     -0.0029678       0.11553       -0.1939       -
0.55661    0       0.19843       -0.28322      -0.021517      0.0048961
0.019889       0.016058     0.00035061      0.0025865       0.01371      -
0.027467
        -0.0016913       0.003707     0.00013668       0.014235      -
0.023123       0.19843    0      -0.53452       -0.34774      -0.066932
-0.16245       -0.01838       0.017273     -0.0055572       -0.0534
0.12335
          0.004742     -0.0055285       0.016976      -0.011788
0.13809      -0.28322       -0.53452    0       0.63986       0.35597
0.36387       0.16263      -0.023229       0.034587       0.16963      -
0.35782
        -0.0019674      0.0021143      -0.012601       0.016961      -
0.012595      -0.021517       -0.34774       0.63986    0       -1.5961
```

```
-0.97182       -0.56946       0.027632       -0.10173       -0.43091
0.88099
        -0.00048335      0.0011142     -0.0025095       0.010336
0.019527      0.0048961      -0.066932        0.35597        -1.5961    0
-0.4838      -0.063585       0.051721     -0.0026156       -0.10778
0.26747
         -0.0015116       0.001846     -0.0082763       0.013229      -
0.010605       0.019889       -0.16245        0.36387       -0.97182        -
0.4838    0       -1.6539       0.091181       -0.34548       -0.91053
1.7738
         -0.0004312     0.00080805     -0.0021597      0.0061788
0.0035518       0.016058       -0.01838        0.16263       -0.56946      -
0.063585        -1.6539    0       0.14662       -0.11237       -0.28588
0.68256
        8.6835e-005    -2.9279e-005     0.00074177    -0.00075787
0.0015096     0.00035061       0.017273      -0.023229       0.027632
0.051721       0.091181        0.14662    0       0.27311        0.65709
-1.2385
        2.7384e-006    2.4462e-006    -0.00049272      0.0012881
0.00077762      0.0025865     -0.0055572       0.034587       -0.10173     -
0.0026156       -0.34548       -0.11237        0.27311    0        -0.886
1.8678
        -0.00045016     0.00058752     -0.0033385      0.0064391     -
0.0024013        0.01371        -0.0534        0.16963       -0.43091       -
0.10778       -0.91053       -0.28588        0.65709        -0.886    0
-0.45009
          0.0010803     -0.0013332      0.0074792      -0.013528
0.0067173      -0.027467        0.12335       -0.35782        0.88099
0.26747        1.7738        0.68256        -1.2385        1.8678       -
0.45009    0   ];
```

the number of interloper channels: 15

```
       D = [    0.58439     -0.020964        0.76968      -0.021117
0.8051      -0.032729       -0.74684      -0.018542        0.79778       -
0.43173        0.13863        0.80692        0.62287       -0.59664
0.39925       0.019388        0.38229    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 137209.9028 137324.8899 138576.6722 ];
       mu= [ -0.00368    0.12120    -0.00597     0.14957    -0.01254
0.18442    -1.02790     0.23809    -0.01991     0.23217     0.39287    -0.08769
-0.04771     0.29800    -0.17506    -0.33241    -0.04182   ];
       K = [0      -0.43278      -0.014306       0.080037       0.0011357
0.0075259      0.00074293       0.0040081     -0.00042863       0.0015975      -
0.0007726     5.4492e-005     2.5704e-005      0.00017455     7.7811e-005    -
5.3635e-005      0.00027234
          -0.43278    0       0.090664       -0.11802       0.0059891      -
0.0033436      -0.0025299      -0.0046191       0.0008483       -0.001765
0.00086496      0.00010583      1.021e-005     -0.00012732    -7.9784e-005
7.4678e-005     -0.00049038
         -0.014306       0.090664    0       -0.48895       -0.014782
0.11652      -0.0038811       0.012046      -0.0016703       0.0088659      -
0.0030047      0.00035198     -0.00013996       0.0017515      0.00014181    -
5.6027e-005      -0.0001834
          0.080037       -0.11802       -0.48895    0       0.12894        -
0.1941       -0.010014      -0.0034251       0.005894       -0.010626
0.0026117       0.0009307      0.00066384      -0.0024584     7.8474e-005    -
2.3838e-005       0.0001398
```

```
          0.0011357      0.0059891      -0.014782        0.12894    0      -
0.54514      0.0026167        0.14193       0.005295       0.021017      -
0.017853      0.0035166     0.00027485      0.0060445     0.00086192     -
0.00066029     -0.0010724
          0.0075259     -0.0033436        0.11652        -0.1941       -
0.54514    0      -0.14535       -0.28358       0.018595      -0.014206
0.026742       0.006084      0.0031076      -0.013213    -0.00011278
0.0004056       0.001255
         0.00074293     -0.0025299     -0.0038811      -0.010014
0.0026167       -0.14535    -2.2531e-010        0.60848     -0.0070854
-0.13805       0.013001      -0.025839      -0.004656     -0.0064477      -
0.0025982      0.0014918       0.0031204
          0.0040081     -0.0046191       0.012046     -0.0034251
0.14193       -0.28358        0.60848    -3.6916e-010         0.1961       -
0.40419      -0.027274       0.027616       0.018845      -0.046216
0.0059049     -0.0033532       0.0066312
        -0.00042863      0.0008483     -0.0016703       0.005894
0.005295       0.018595     -0.0070854         0.1961    0      -0.65833
-0.26057       0.086568        0.03789       0.012895       0.019959      -
0.010686      -0.010793
          0.0015975      -0.001765      0.0088659      -0.010626
0.021017      -0.014206       -0.13805       -0.40419       -0.65833    -
8.0916e-010        0.77336       0.057215       0.016726       -0.15628
-0.01268      0.0084215       0.030481
         -0.0007726     0.00086496     -0.0030047      0.0026117      -
0.017853       0.026742       0.013001      -0.027274       -0.26057
0.77336    -1.4085e-009        -1.4827       -0.25891        0.96635      -
0.090909        0.10808       -0.04416
        5.4492e-005     0.00010583     0.00035198      0.0009307
0.0035166       0.006084      -0.025839       0.027616       0.086568
0.057215        -1.4827    -4.7298e-010        0.11261      -0.032698
0.054479     -0.0022549       0.0011197
        2.5704e-005     1.021e-005     -0.00013996     0.00066384
0.00027485      0.0031076      -0.004656       0.018845        0.03789
0.016726       -0.25891        0.11261     7.0114e-010       -0.72435
0.10254      -0.073348       -0.024406
         0.00017455     -0.00012732      0.0017515     -0.0024584
0.0060445      -0.013213     -0.0064477      -0.046216       0.012895
-0.15628        0.96635      -0.032698       -0.72435    -1.952e-009
-0.2313        0.49303        0.28681
        7.7811e-005    -7.9784e-005     0.00014181     7.8474e-005
0.00086192     -0.00011278     -0.0025982      0.0059049       0.019959
-0.01268      -0.090909       0.054479        0.10254        -0.2313    0
0.44575        0.18928
       -5.3635e-005     7.4678e-005    -5.6027e-005    -2.3838e-005     -
0.00066029      0.0004056      0.0014918     -0.0033532      -0.010686
0.0084215        0.10808     -0.0022549      -0.073348        0.49303
0.44575    3.6644e-010       -0.25694
         0.00027234     -0.00049038     -0.0001834      0.0001398      -
0.0010724       0.001255      0.0031204      0.0066312      -0.010793
0.030481       -0.04416      0.0011197      -0.024406        0.28681
0.18928       -0.25694    0   ];
```

the number of interloper channels: 16

```
       D = [     0.58399     -0.020523        0.76788      -0.019286
0.79537      -0.016649       -0.74185       -0.01752        0.65211      -
0.035603        0.56919      -0.029425        0.45911       0.039773
0.49726       -0.15001        -0.3398      -0.054377    ];
```

```
      I = [124417.3000   124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 137209.9028 137324.8899 138576.6722
138683.7056 ];
      mu= [ -0.00368    0.12120    -0.00598     0.14953    -0.01263
0.18539    -1.02560     0.22714    -0.05412     0.30030    -0.05348     0.29285
-0.18045    -0.34685    -0.05217     0.04592     0.81807    -0.47866   ];
      K = [0     -0.43278      -0.014315       0.080044       0.001161
0.0074832     0.00089657      0.0041282    -0.00022883      0.0014482    -
0.00019109     0.00092779     0.00023879    -0.00041982     0.00036619
-0.00059617    9.8907e-005      0.0002817
          -0.43278    0      0.090673       -0.11802       0.005968     -
0.0032952     -0.0027036     -0.0047389     0.00061762     -0.0015595
0.00034903      -0.001119    -0.00035946     0.00071513    -0.00075094
0.0012673    -0.00012704    -0.00023138
         -0.014315       0.090673    0      -0.48886      -0.014568
0.11639     -0.0032586       0.012799    -0.00050024      0.0082149    -
0.00060653      0.0033384     0.00011947    -0.00028289    -0.00085395
0.0013882     0.00043451      0.0017142
          0.080044       -0.11802       -0.48886    0       0.12863       -
0.19405      -0.010529     -0.0042652      0.0043569     -0.0097919
0.0014898     -0.0031891     4.8381e-005     0.00055972     0.00080612     -
0.0010482    -0.00052425     -0.0017177
          0.001161       0.005968      -0.014568        0.12863    0       -
0.5466       0.006156        0.14275      0.0079796       0.016711     -
0.0012861       0.015566     0.00047469    -0.00046071     -0.0033172
0.0052749      0.0018418      0.0065828
         0.0074832     -0.0032952        0.11639       -0.19405        -
0.5466    0       -0.1517       -0.28283       0.015369      -0.003625
0.008782      -0.019416      0.0010507      0.0011985      0.0030875     -
0.0038158     -0.0023434     -0.0072421
        0.00089657     -0.0027036     -0.0032586      -0.010529
0.006156        -0.1517    0       0.59617      -0.020526       -0.15257
-0.0090614      -0.031353     -0.0037152      0.0016642       0.013844
-0.023437     -0.0053976      -0.021572
         0.0041282     -0.0047389       0.012799     -0.0042652
0.14275       -0.28283        0.59617    0       0.13489       -0.39735
0.029047      -0.027478      0.0056967      0.0073214       0.025264      -
0.034846      -0.009852      -0.032191
        -0.00022883     0.00061762    -0.00050024      0.0043569
0.0079796       0.015369      -0.020526        0.13489    0       -0.6518
0.037778        0.11091       0.018817        0.01159      -0.014514
0.036004      0.0057818       0.032236
         0.0014482     -0.0015595      0.0082149     -0.0097919
0.016711      -0.003625       -0.15257       -0.39735        -0.6518    0
0.16429       -0.51752       0.044428      -0.036125       0.036557      -
0.042248      -0.016621      -0.046665
        -0.00019109     0.00034903    -0.00060653      0.0014898     -
0.0012861       0.008782     -0.0090614       0.029047       0.037778
0.16429    0      -0.65814       0.077494      -0.037237      -0.050001
0.13023       0.020004        0.11829
         0.00092779      -0.001119      0.0033384     -0.0031891
0.015566      -0.019416      -0.031353      -0.027478        0.11091       -
0.51752       -0.65814    0      -0.12534        0.35324        0.32837
-0.46989       -0.16909       -0.56151
         0.00023879    -0.00035946     0.00011947    4.8381e-005
0.00047469      0.0010507     -0.0037152      0.0056967       0.018817
0.044428       0.077494       -0.12534    0       0.48727        0.23954
-0.2751       -0.20465       -0.57607
        -0.00041982     0.00071513    -0.00028289     0.00055972    -
```

```
0.00046071      0.0011985      0.0016642      0.0073214        0.01159
-0.036125      -0.037237       0.35324        0.48727    0      -0.38211
0.61017        0.29738        1.0701
        0.00036619    -0.00075094    -0.00085395     0.00080612     -
0.0033172      0.0030875       0.013844       0.025264      -0.014514
0.036557      -0.050001        0.32837        0.23954       -0.38211    0
-0.28946       -0.29829       -0.90012
       -0.00059617      0.0012673      0.0013882     -0.0010482
0.0052749     -0.0038158      -0.023437      -0.034846       0.036004      -
0.042248        0.13023       -0.46989        -0.2751        0.61017       -
0.28946    0        0.4237         1.5866
       9.8907e-005    -0.00012704     0.00043451    -0.00052425
0.0018418     -0.0023434     -0.0053976      -0.009852      0.0057818
-0.016621       0.020004       -0.16909       -0.20465        0.29738       -
0.29829         0.4237    0      -0.77362
         0.0002817    -0.00023138      0.0017142     -0.0017177
0.0065828     -0.0072421      -0.021572      -0.032191       0.032236      -
0.046665        0.11829       -0.56151       -0.57607        1.0701       -
0.90012         1.5866       -0.77362    0   ];
```

the number of interloper channels: 17

```
      D = [     0.58458     -0.021406        0.76901      -0.020509
0.80182      -0.027702       -0.74154     -0.0078147        0.74927       -
0.36213       0.014088        0.80663           0.72       -0.31112
0.87868       -0.70577        0.36886        0.47715        0.25618    ];
      I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 137209.9028 137324.8899 138576.6722
138683.7056 139832.1965 ];
      mu= [ -0.00368    0.12120    -0.00597     0.14956    -0.01255
0.18469    -1.02721     0.23515    -0.02873     0.25317     0.37565    -0.05218
-0.09054    -0.10283    -0.10110    -0.09285    -0.14295     0.46191    -
0.31800   ];
      K = [0     -0.43278      -0.014309        0.08004      0.0011422
0.007519     0.00077998      0.0040663    -0.00032776      0.0015772      -
0.001211     0.00018138     0.00039591    -0.00043925     6.8507e-005    -
4.6628e-005    -6.3451e-005     -0.00050546     -0.00017404
         -0.43278    0      0.090668       -0.11802      0.0059857     -
0.0033406     -0.0025729     -0.0046985      0.00072815     -0.0017897
0.001766    -8.9109e-005     -0.00072565      0.00093523     -0.0001818
0.0002493     0.00012288     0.00070534      0.00030584
         -0.014309       0.090668    0      -0.48892      -0.014713
0.11647      -0.0037407        0.01224     -0.0011799      0.0084796     -
0.0023573     0.00053857     -0.00060609      0.0011275      -0.001063
0.0017991     -0.0001506     -0.0019752     -0.00015514
          0.08004       -0.11802       -0.48892    0       0.12885       -
0.19408      -0.010122      -0.0036485      0.0052946      -0.010316
0.0023809     0.00072427     0.00085121     -0.00097894      0.0017613     -
0.0025777     0.00038772      0.0031503     0.00032456
         0.0011422      0.0059857      -0.014713        0.12885    0      -
0.54559      0.0034536        0.1421      0.0067576       0.018742      -
0.013718      0.0046401     -0.0021677      0.0049695     -0.0030648
0.0055055     -0.00038162      -0.005286     -0.00071935
          0.007519     -0.0033406        0.11647       -0.19408       -
0.54559    0      -0.14688       -0.28327       0.016736      -0.010808
0.022204      0.0040875      0.0051018     -0.0065557      0.0083774      -
0.012595      0.0016443       0.013778      0.0024163
        0.00077998     -0.0025729     -0.0037407      -0.010122
```

```
0.0034536       -0.14688    0       0.60537      -0.012104       -0.13791
0.0045996      -0.025457       0.003633      -0.012556      0.0035512     -
0.0083503    -0.00042723      0.0049811    -0.00072237
         0.0040663     -0.0046985        0.01224     -0.0036485
0.1421       -0.28327        0.60537    0       0.17654       -0.40203      -
0.024391       0.030604        0.02717      -0.024933       0.043181      -
0.059386      0.0081001       0.059654       0.0069684
        -0.00032776     0.00072815     -0.0011799      0.0052946
0.0067576       0.016736      -0.012104        0.17654    0      -0.67243
-0.17403        0.10162        0.00929       0.039298       0.020858     -
0.0091664      0.0087205       0.023845      0.0071745
         0.0015772     -0.0017897      0.0084796      -0.010316
0.018742      -0.010808       -0.13791       -0.40203       -0.67243    0
0.6744      0.0016847       0.068524       -0.11643       0.074185       -
0.12862       0.007884        0.11198       0.012433
         -0.001211       0.001766     -0.0023573      0.0023809      -
0.013718       0.022204      0.0045996      -0.024391       -0.17403
0.6744    0       -1.4594       -0.24362        0.27489       -0.75914
1.1006       -0.15179       -1.1945       -0.17671
         0.00018138    -8.9109e-005     0.00053857     0.00072427
0.0046401      0.0040875      -0.025457       0.030604        0.10162
0.0016847        -1.4594    0      0.094745        0.01777        0.14032
-0.12483       0.042015        0.16347       0.037014
         0.00039591    -0.00072565    -0.00060609     0.00085121     -
0.0021677      0.0051018       0.003633        0.02717        0.00929
0.068524       -0.24362       0.094745    0     -0.022792        0.58808
-0.78001        0.16209        0.99111        0.19119
        -0.00043925     0.00093523      0.0011275    -0.00097894
0.0049695     -0.0065557      -0.012556      -0.024933       0.039298
-0.11643        0.27489        0.01777      -0.022792    0       -0.7176
1.0767       -0.16131       -1.3469       -0.2279
        6.8507e-005     -0.0001818      -0.001063      0.0017613     -
0.0030648      0.0083774      0.0035512       0.043181       0.020858
0.074185       -0.75914        0.14032       0.58808       -0.7176    0
-0.016187       0.065533        0.15602       0.10347
       -4.6628e-005      0.0002493      0.0017991     -0.0025777
0.0055055      -0.012595     -0.0083503      -0.059386     -0.0091664
-0.12862         1.1006       -0.12483      -0.78001         1.0767      -
0.016187    0     -0.028012       -0.33804       -0.11636
       -6.3451e-005     0.00012288     -0.0001506     0.00038772     -
0.00038162      0.0016443     -0.00042723      0.0081001      0.0087205
0.007884       -0.15179       0.042015        0.16209       -0.16131
0.065533      -0.028012    0      -0.75674       -0.13216
        -0.00050546     0.00070534     -0.0019752      0.0031503      -
0.005286       0.013778      0.0049811       0.059654       0.023845
0.11198        -1.1945        0.16347       0.99111       -1.3469
0.15602       -0.33804       -0.75674    0      -0.81201
        -0.00017404     0.00030584    -0.00015514     0.00032456     -
0.00071935      0.0024163     -0.00072237      0.0069684      0.0071745
0.012433       -0.17671       0.037014        0.19119        -0.2279
0.10347       -0.11636       -0.13216       -0.81201    0   ];
```

the number of interloper channels: 18

```
       D = [     0.58456     -0.021374        0.76897      -0.020477
0.80163      -0.027604       -0.74105      -0.008608        0.73984       -
0.36617       0.043331        0.81819       0.79866       -0.42926
0.74387       -0.52443        0.40319       0.36561        0.27929      -
0.042871    ];
```

```
      I = [124417.3000   124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 137209.9028 137324.8899 138576.6722
138683.7056 139832.1965 139931.2520 ];
      mu= [ -0.00368   0.12120   -0.00597    0.14955   -0.01256
0.18478   -1.02700    0.23412   -0.03185    0.26000    0.36280   -0.02298
-0.05565   -0.03797   -0.13980   -0.17361   -0.16058    0.51860   -
0.17671   -0.37916  ];
      K = [0     -0.43278       -0.01431        0.08004      0.0011458
0.0075137     0.00079198      0.0040777    -0.00029353      0.0015297     -
0.0011864     0.00025291     0.00041997    -0.00047985   -4.5077e-007
5.8972e-005   -9.5973e-005    -0.00045212   -6.4054e-005     0.00022734
         -0.43278   0      0.090668       -0.11802      0.0059817     -
0.0033338     -0.0025851      -0.004709     0.00068177     -0.0017175
0.0017525    -0.00019677    -0.00078383      0.0010308   -2.5761e-005
1.32e-005     0.00018131     0.00069863     0.00013317    -0.00037157
         -0.01431       0.090668   0      -0.48892      -0.014693
0.11646     -0.0036841       0.012317     -0.0010543      0.0084173      -
0.002233     0.00064443    -0.00077375      0.0013823    -0.00076467
0.0013833    -0.00020567     -0.0012986   -1.9002e-005     0.00031107
          0.08004       -0.11802       -0.48892   0       0.12882       -
0.19407      -0.010167     -0.0037317      0.0051351      -0.010277
0.0023258     0.00063612       0.001098     -0.0013493      0.0014325     -
0.0021404       0.000523      0.0022888     0.00010978    -0.00058579
         0.0011458      0.0059817      -0.014693        0.12882   0      -
0.54573      0.0037799        0.14221      0.0070945       0.018219       -
0.01286      0.0053482     -0.0026687      0.0057497     -0.0017571
0.0036376      -0.000303     -0.0025678    -0.00010375     0.00080313
         0.0075137     -0.0033338        0.11646       -0.19407       -
0.54573   0      -0.14746       -0.28325       0.016331     -0.0099787
0.021313      0.0030555      0.0063188     -0.0084487      0.0060797     -
0.0094779      0.0017855      0.0083599     0.00080778     -0.0028076
        0.00079198     -0.0025851     -0.0036841      -0.010167
0.0037799       -0.14746   0       0.60419      -0.013427       -0.13877
0.0028618      -0.025538      0.0048784      -0.014299      0.0016861     -
0.0055192    -0.00051918      0.0018882    -0.00065948     0.00034731
         0.0040777      -0.004709       0.012317     -0.0037317
0.14221       -0.28325        0.60419    -7.479e-010        0.17093       -
0.40359      -0.022403       0.033396       0.035277      -0.036923
0.036548      -0.050974       0.010624        0.04346      0.0030738      -
0.011086
       -0.00029353     0.00068177     -0.0010543      0.0051351
0.0070945       0.016331      -0.013427        0.17093    -2.316e-009
-0.67579       -0.15549        0.11165       0.014245       0.032279
0.029128      -0.022988       0.012931       0.032907      0.0055819      -
0.010947
         0.0015297     -0.0017175      0.0084173      -0.010277
0.018219     -0.0099787       -0.13877       -0.40359       -0.67579    -
1.9752e-009        0.66407      -0.036678       0.073201       -0.12675
0.031193       -0.06709      0.0021528       0.036434   -2.6796e-006     -
0.0087938
        -0.0011864      0.0017525      -0.002233      0.0023258       -
0.01286       0.021313      0.0028618      -0.022403       -0.15549
0.66407   -1.2151e-007        -1.4878       -0.37207        0.47623       -
0.64992        0.97051       -0.20282       -0.88787      -0.075068
0.26158
         0.00025291    -0.00019677     0.00064443     0.00063612
0.0053482      0.0030555      -0.025538       0.033396        0.11165      -
0.036678        -1.4878      9.29e-009         0.1369      -0.035318
0.17214       -0.17514        0.06347        0.18353       0.025716      -
```

```
0.058502
        0.00041997    -0.00078383    -0.00077375       0.001098     -
0.0026687      0.0063188      0.0048784       0.035277       0.014245
0.073201       -0.37207         0.1369   -1.5492e-008       -0.17477
0.57133       -0.77112        0.22477        0.81971       0.096864       -
0.26791
       -0.00047985      0.0010308      0.0013823     -0.0013493
0.0057497     -0.0084487      -0.014299      -0.036923       0.032279
-0.12675        0.47623      -0.035318       -0.17477    5.1642e-009       -
0.70905         1.0869        -0.2506         -1.136       -0.10527
0.36429
       -4.5077e-007    -2.5761e-005    -0.00076467      0.0014325     -
0.0017571      0.0060797      0.0016861       0.036548       0.029128
0.031193       -0.64992        0.17214        0.57133       -0.70905    -
1.0084e-008        0.16067       0.022915      -0.083033        0.03991
-0.010226
       5.8972e-005      1.32e-005      0.0013833     -0.0021404
0.0036376     -0.0094779     -0.0055192      -0.050974      -0.022988
-0.06709        0.97051       -0.17514       -0.77112         1.0869
0.16067    -3.4806e-008       0.034933       0.052449     -0.0021498
0.045765
       -9.5973e-005     0.00018131    -0.00020567       0.000523      -
0.000303      0.0017855    -0.00051918       0.010624       0.012931
0.0021528       -0.20282        0.06347        0.22477        -0.2506
0.022915       0.034933    8.1235e-009       -0.66572      -0.048265
0.22071
       -0.00045212     0.00069863     -0.0012986      0.0022888     -
0.0025678      0.0083599      0.0018882        0.04346       0.032907
0.036434       -0.88787        0.18353        0.81971         -1.136      -
0.083033       0.052449       -0.66572    -1.858e-008       -0.28599
0.66511
       -6.4054e-005     0.00013317   -1.9002e-005     0.00010978    -
0.00010375     0.00080778    -0.00065948      0.0030738      0.0055819    -
2.6796e-006      -0.075068       0.025716       0.096864       -0.10527
0.03991     -0.0021498      -0.048265       -0.28599    9.7058e-010
0.52565
        0.00022734    -0.00037157     0.00031107    -0.00058579
0.00080313     -0.0028076     0.00034731      -0.011086      -0.010947
-0.0087938        0.26158      -0.058502       -0.26791        0.36429
-0.010226       0.045765        0.22071        0.66511        0.52565
9.1827e-009    ];
```

the number of interloper channels: 19

```
       D = [     0.58457     -0.021388        0.76899      -0.020522
0.80164      -0.027643       -0.74109     -0.0089254        0.73967       -
0.36623        0.04815        0.81726         0.7941       -0.42255
0.74477       -0.52404        0.40645        0.36829        0.27951      -
0.040042        0.17945    ];
       I = [124417.3000   124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 137209.9028 137324.8899 138576.6722
138683.7056 139832.1965 139931.2520 140976.0916 ];
       mu= [ -0.00368    0.12120    -0.00597     0.14955    -0.01256
0.18478    -1.02700     0.23413    -0.03185     0.25998     0.36283    -0.02306
-0.05582    -0.03820    -0.13965    -0.17323    -0.16052     0.51897    -
0.17679    -0.37896    -0.10885   ];
       K = [0     -0.43278       -0.01431        0.08004       0.0011458
0.0075137      0.00079192      0.0040775    -0.00029371      0.0015298     -
```

```
0.0011841     0.00025232     0.00041781    -0.00047652    3.2694e-009
5.9436e-005   -9.4149e-005    -0.00045037   -6.4217e-005     0.00023001
0.00013524
          -0.43278    0      0.090668       -0.11802      0.0059817     -
0.0033338      -0.002585     -0.0047087     0.00068202     -0.0017177
0.0017492    -0.00019591    -0.00078066      0.0010259   -2.6649e-005
1.2848e-005     0.00017861     0.00069576      0.0001334    -0.00037537
-0.00019642
          -0.01431       0.090668    0      -0.48892      -0.014693
0.11646     -0.0036844       0.012316     -0.0010548      0.0084174     -
0.0022269     0.00064306    -0.00077865      0.0013897    -0.00076556
0.0013874    -0.00020141     -0.0012967   -1.9644e-005     0.00031933
0.00037083
           0.08004       -0.11802       -0.48892    0       0.12882       -
0.19407      -0.010167     -0.0037305       0.005136      -0.010277
0.0023138     0.00063843      0.0011074     -0.0013636      0.0014333     -
0.0021469     0.00051475      0.0022841     0.00011083    -0.00060064    -
0.00068673
          0.0011458      0.0059817      -0.014693        0.12882    0      -
0.54573      0.0037787        0.14221      0.0070937        0.01822      -
0.012862      0.0053464     -0.0026673      0.0057477     -0.0017621
0.0036458    -0.00030368     -0.0025733    -0.00010546     0.00081075
0.00020087
          0.0075137     -0.0033338        0.11646       -0.19407       -
0.54573    0      -0.14745       -0.28325       0.016332     -0.0099812
0.021317      0.0030573      0.0063124     -0.0084399      0.0060893     -
0.0094937      0.0017875      0.0083686     0.00081246     -0.0028266    -
0.00051388
         0.00079192      -0.002585     -0.0036844      -0.010167
0.0037787       -0.14745    0       0.60419      -0.013425       -0.13877
0.0028551      -0.025536      0.0048841      -0.014307      0.0016938      -
0.005535    -0.00052459      0.0018943    -0.00065791     0.00033049    -
0.00063136
          0.0040775     -0.0047087       0.012316     -0.0037305
0.14221       -0.28325        0.60419    0       0.17095       -0.40359
-0.022438       0.033393       0.035272      -0.036921       0.036584
-0.05105       0.010602       0.043469      0.0030954      -0.011214     -
0.0045446
         -0.00029371     0.00068202     -0.0010548       0.005136
0.0070937       0.016332      -0.013425        0.17095    0      -0.67578
-0.15554        0.11162       0.014225       0.032298       0.029113      -
0.022977       0.012914       0.032859      0.0055935      -0.011008     -
0.0025362
          0.0015298     -0.0017177      0.0084174      -0.010277
0.01822     -0.0099812       -0.13877       -0.40359       -0.67578    0
0.66412      -0.036588       0.073156       -0.12667       0.031338      -
0.067295      0.0022141       0.036627    2.9834e-005     -0.0088977     -
0.0010067
         -0.0011841      0.0017492     -0.0022269      0.0023138      -
0.012862       0.021317      0.0028551      -0.022438       -0.15554
0.66412    0       -1.4877       -0.37155        0.47555       -0.65051
0.97163        -0.2027       -0.88803      -0.075495        0.26362
0.066091
         0.00025232    -0.00019591     0.00064306     0.00063843
0.0053464      0.0030573      -0.025536       0.033393        0.11162      -
0.036588        -1.4877    0        0.1367      -0.035074        0.17213
-0.17518       0.063433        0.18341       0.025791       -0.05884      -
0.011885
         0.00041781    -0.00078066    -0.00077865      0.0011074     -
0.0026673      0.0063124      0.0048841       0.035272       0.014225
```

```
0.073156       -0.37155         0.1367    0      -0.17411        0.57154
-0.77168        0.22462        0.81945       0.097219       -0.26956      -
0.056465
       -0.00047652      0.0010259      0.0013897     -0.0013636
0.0057477     -0.0084399      -0.014307      -0.036921       0.032298
-0.12667        0.47555      -0.035074       -0.17411    0      -0.70926
1.0876       -0.25027        -1.1354       -0.10575        0.36665
0.08398
       3.2694e-009    -2.6649e-005    -0.00076556      0.0014333     -
0.0017621      0.0060893      0.0016938       0.036584       0.029113
0.031338       -0.65051        0.17213        0.57154       -0.70926    0
0.15997       0.023096      -0.082217       0.039967      -0.010343
0.0041582
       5.9436e-005    1.2848e-005      0.0013874     -0.0021469
0.0036458     -0.0094937      -0.005535       -0.05105      -0.022977      -
0.067295        0.97163       -0.17518       -0.77168         1.0876
0.15997    0      0.034978       0.051483      -0.002265       0.046436
0.018445
       -9.4149e-005     0.00017861    -0.00020141     0.00051475     -
0.00030368      0.0017875    -0.00052459       0.010602       0.012914
0.0022141        -0.2027       0.063433        0.22462       -0.25027
0.023096       0.034978    0      -0.66508      -0.048525        0.22192
0.04339
       -0.00045037     0.00069576     -0.0012967      0.0022841     -
0.0025733      0.0083686      0.0018943       0.043469       0.032859
0.036627       -0.88803        0.18341        0.81945       -1.1354      -
0.082217       0.051483       -0.66508    0      -0.28609        0.66523
0.028539
       -6.4217e-005      0.0001334    -1.9644e-005     0.00011083     -
0.00010546     0.00081246    -0.00065791      0.0030954      0.0055935
2.9834e-005      -0.075495       0.025791       0.097219       -0.10575
0.039967      -0.002265      -0.048525       -0.28609    0       0.52583
0.00024334
        0.00023001    -0.00037537     0.00031933    -0.00060064
0.00081075     -0.0028266     0.00033049      -0.011214      -0.011008
-0.0088977        0.26362       -0.05884       -0.26956        0.36665      -
0.010343       0.046436        0.22192        0.66523        0.52583    0
0.051646
        0.00013524    -0.00019642     0.00037083    -0.00068673
0.00020087    -0.00051388    -0.00063136     -0.0045446     -0.0025362
-0.0010067       0.066091      -0.011885      -0.056465        0.08398
0.0041582       0.018445        0.04339       0.028539     0.00024334
0.051646    0   ];
```

the number of interloper channels: 20

```
       D = [     0.58457     -0.021386        0.76899      -0.020514
0.80164      -0.027643       -0.74108     -0.0088797        0.73973       -
0.36619       0.047776         0.8172        0.79351       -0.42161
0.74622       -0.52585        0.40669        0.37079        0.28063      -
0.041857        0.18008       0.027212    ];
       I = [124417.3000    124591.5453 126608.6421 126773.7112 128672.7527
128828.9571 130613.8564 130761.4641 132435.5133 132574.7480 134140.6556
134271.6929 135731.5678 135854.5373 137209.9028 137324.8899 138576.6722
138683.7056 139832.1965 139931.2520 140976.0916 141067.0858 ];
       mu= [ -0.00368    0.12120    -0.00597     0.14955    -0.01256
0.18478    -1.02700     0.23414    -0.03183     0.25995     0.36291    -0.02325
-0.05613    -0.03883    -0.13925    -0.17238    -0.16022     0.51819    -
0.17682    -0.37530    -0.10841    -0.13772   ];
```

```
       K = [0     -0.43278       -0.01431        0.08004       0.0011457
0.0075137     0.00079182      0.0040773    -0.00029402      0.0015303     -
0.0011834     0.00025158     0.00041664    -0.00047504    2.5907e-008
5.8653e-005    -9.5049e-005    -0.00045161    -6.9342e-005     0.00023676
0.00013208     -0.0001148
          -0.43278    0      0.090668       -0.11802      0.0059818     -
0.0033339     -0.0025849     -0.0047084     0.00068248     -0.0017185
0.001748     -0.0001948    -0.00077872      0.0010233   -2.7163e-005
1.4766e-005     0.00017994      0.0006971     0.00014158    -0.00038598
-0.00019132     0.00018312
          -0.01431       0.090668    0      -0.48892      -0.014693
0.11646     -0.0036848       0.012315     -0.0010558       0.008418     -
0.0022235     0.00064131    -0.00078121      0.0013918    -0.00077107
0.0013927    -0.00020537     -0.0013055    -3.436e-005     0.00034353
0.00036147    -0.00036733
           0.08004       -0.11802       -0.48892    0       0.12882       -
0.19407      -0.010166     -0.0037291      0.0051374      -0.010277
0.0023068     0.00064093      0.0011123      -0.001368      0.0014413     -
0.0021537     0.00052156      0.0022973     0.00013792     -0.0006447    -
0.00066918     0.00068001
         0.0011457      0.0059818      -0.014693        0.12882    0      -
0.54573      0.0037765        0.14221      0.0070922       0.018223      -
0.012867      0.0053423     -0.0026633      0.0057403     -0.0017739
0.0036622    -0.00030523     -0.0025975     -0.0001085     0.00080871
0.00020244     4.3357e-005
         0.0075137     -0.0033339        0.11646       -0.19407       -
0.54573    0      -0.14745       -0.28325       0.016334     -0.0099855
0.021324      0.0030628      0.0063012     -0.0084214      0.0061105     -
0.0095209      0.0017885      0.0084225     0.00082597     -0.0028211    -
0.00051353    -5.6653e-006
         0.00079182     -0.0025849     -0.0036848      -0.010166
0.0037765       -0.14745    0        0.6042      -0.013419       -0.13876
0.0028569      -0.025533      0.0048836        -0.0143      0.0017193     -
0.0055683    -0.00051459      0.0019279    -0.00063822     0.00028601    -
0.00061951      0.0005528
         0.0040773     -0.0047084       0.012315     -0.0037291
0.14221       -0.28325         0.6042    0       0.17098       -0.40358
-0.022474       0.033381       0.035233      -0.036847       0.036687
-0.05116       0.010625       0.043695      0.0032559      -0.011389      -
0.004461      0.0031409
        -0.00029402     0.00068248     -0.0010558      0.0051374
0.0070922       0.016334      -0.013419        0.17098    0      -0.67577
-0.15564        0.11157       0.014188       0.032345       0.029077      -
0.022893       0.012899       0.032882      0.0057121      -0.011084     -
0.0024624      0.0022868
         0.0015303     -0.0017185       0.008418      -0.010277
0.018223     -0.0099855       -0.13876       -0.40358       -0.67577    0
0.66418      -0.036352       0.073118       -0.12657       0.031666      -
0.067768      0.0022676       0.037186    2.0267e-005     -0.0088294     -
0.0010885     -0.0022442
         -0.0011834       0.001748     -0.0022235      0.0023068      -
0.012867       0.021324      0.0028569      -0.022474       -0.15564
0.66418    0       -1.4874       -0.37053        0.47382        -0.6519
0.97306       -0.20265       -0.89202      -0.077486        0.26428
0.065317      -0.024743
         0.00025158     -0.0001948     0.00064131     0.00064093
0.0053423      0.0030628      -0.025533       0.033381        0.11157      -
0.036352        -1.4874    0       0.13633      -0.034583        0.17209
-0.175       0.063343        0.18383       0.026247      -0.058958      -
0.011649      0.0067758
```

```
        0.00041664    -0.00077872    -0.00078121      0.0011123     -
0.0026633      0.0063012      0.0048836       0.035233       0.014188
0.073118       -0.37053        0.13633    0      -0.17267        0.57202
-0.77194        0.22436        0.82225       0.099103       -0.26984      -
0.055667        0.02277
       -0.00047504      0.0010233      0.0013918      -0.001368
0.0057403     -0.0084214        -0.0143      -0.036847       0.032345
-0.12657        0.47382      -0.034583       -0.17267    0      -0.70965
1.0876       -0.24974        -1.1388       -0.10806        0.36649
0.082996      -0.025564
       2.5907e-008   -2.7163e-005    -0.00077107      0.0014413     -
0.0017739      0.0061105      0.0017193       0.036687       0.029077
0.031666        -0.6519        0.17209        0.57202       -0.70965    0
0.15809       0.023861      -0.080148       0.040835      -0.012161
0.0043968       0.015165
       5.8653e-005    1.4766e-005      0.0013927     -0.0021537
0.0036622     -0.0095209     -0.0055683       -0.05116      -0.022893
-0.067768        0.97306         -0.175       -0.77194         1.0876
0.15809    0      0.034009       0.048263     -0.0032017       0.048053
0.018397     -0.0089606
      -9.5049e-005     0.00017994    -0.00020537     0.00052156    -
0.00030523      0.0017885    -0.00051459       0.010625       0.012899
0.0022676       -0.20265       0.063343        0.22436       -0.24974
0.023861       0.034009    0      -0.66596      -0.048427        0.21892
0.043789       0.024734
       -0.00045161      0.0006971     -0.0013055      0.0022973     -
0.0025975      0.0084225      0.0019279       0.043695       0.032882
0.037186       -0.89202        0.18383        0.82225       -1.1388      -
0.080148       0.048263       -0.66596    0      -0.28944        0.66366
0.028226        0.01086
      -6.9342e-005     0.00014158    -3.436e-005     0.00013792     -
0.0001085     0.00082597    -0.00063822      0.0032559      0.0057121
2.0267e-005      -0.077486       0.026247       0.099103       -0.10806
0.040835     -0.0032017      -0.048427       -0.28944    0       0.51992
0.0018899       0.078655
        0.00023676    -0.00038598     0.00034353     -0.0006447
0.00080871     -0.0028211     0.00028601      -0.011389      -0.011084
-0.0088294        0.26428      -0.058958       -0.26984        0.36649
-0.012161       0.048053        0.21892        0.66366        0.51992    0
0.047987       -0.14823
        0.00013208    -0.00019132     0.00036147    -0.00066918
0.00020244    -0.00051353    -0.00061951      -0.004461     -0.0024624
-0.0010885       0.065317      -0.011649      -0.055667       0.082996
0.0043968       0.018397       0.043789       0.028226      0.0018899
0.047987    0      0.055037
        -0.0001148     0.00018312    -0.00036733     0.00068001
4.3357e-005    -5.6653e-006      0.0005528      0.0031409      0.0022868
-0.0022442      -0.024743      0.0067758        0.02277      -0.025564
0.015165     -0.0089606       0.024734        0.01086       0.078655       -
0.14823       0.055037    0   ];
```