EMIR Efficiency Calculator tool

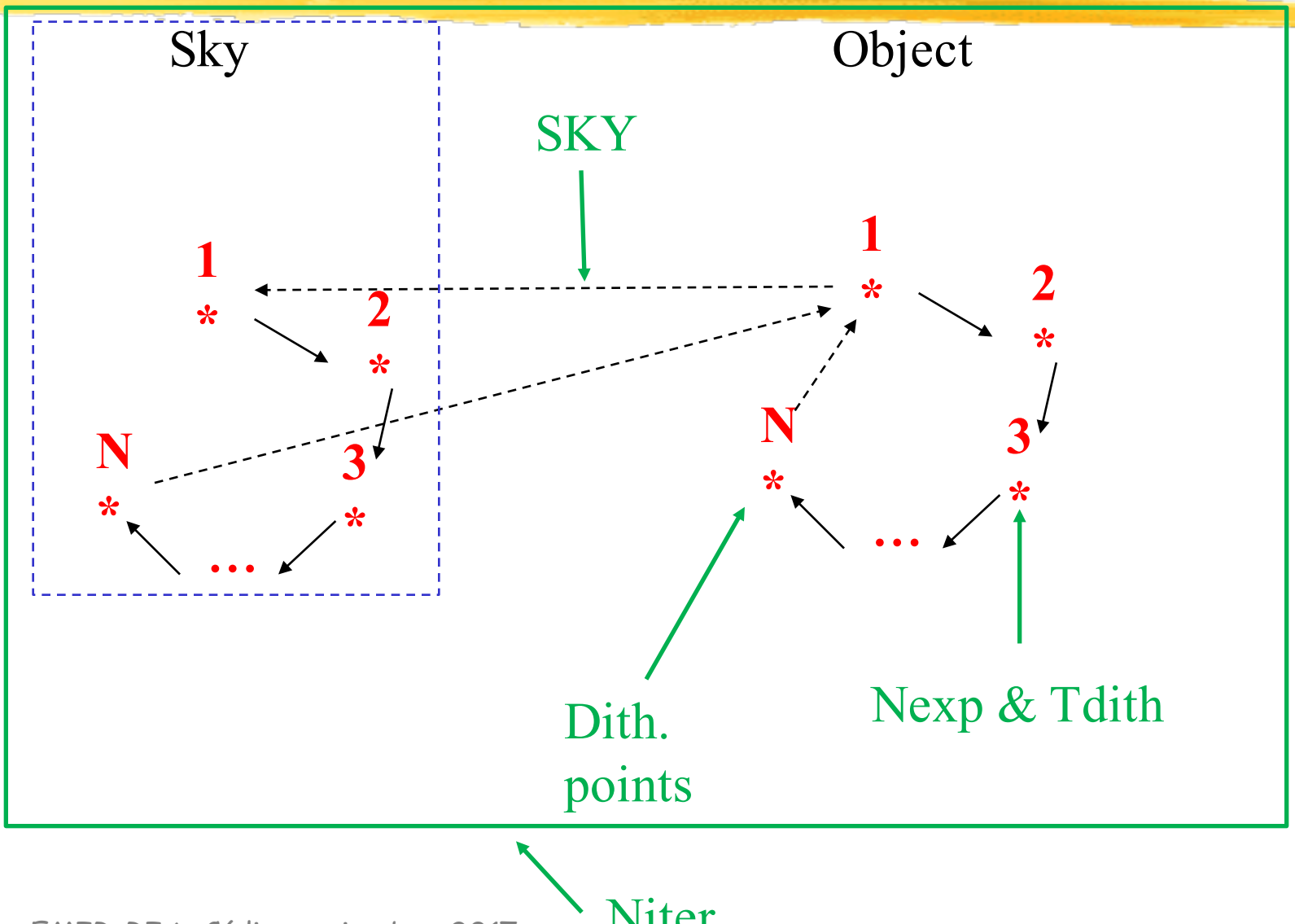
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EMIR PI

Preliminars

- EMIR does not permit full configuration of an observing sequence.
- Instead, the ECS selects the "best" parameters depending upon:
  - On source exposure time: Tsrc
  - Full or limited detector integration time set: Tmin / Tmax
  - Band filter or Spectroscopy
  - Dither pattern
  - Separated SKY obs: y/n

Obs. Sequence structure



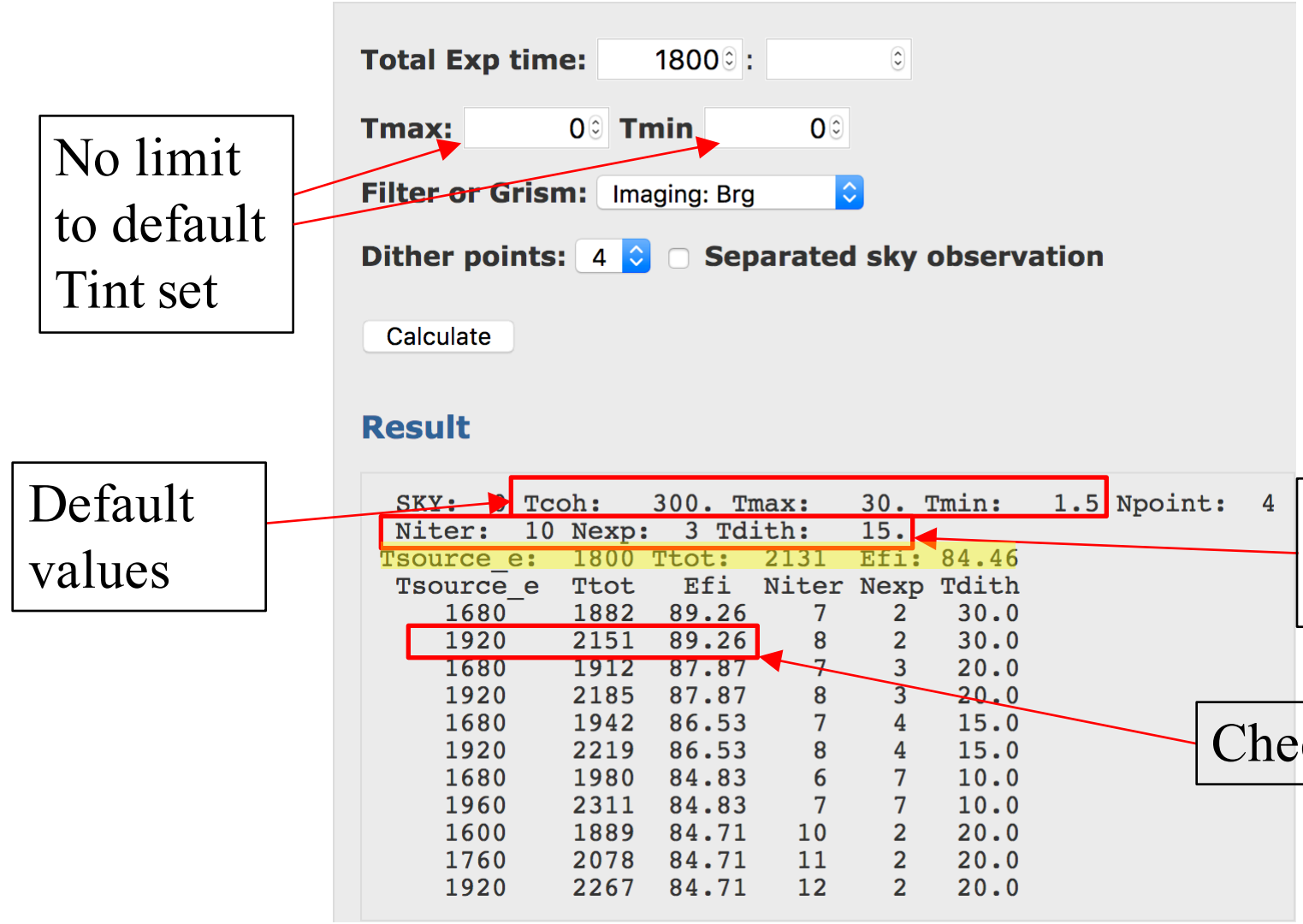
Detector Tint's

- Due to drifts in detector reads with time
- Calibrated only for a set of detector's conf.:
  - CDS: 1.5, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15 s
  - RAMP:
    - [20s,30s]@5reads
    - [60s,120s]@10reads
    - [160s:360s:40s]@(10+3*i)reads
- User can define a subset with Tmin/Tmax

To be aware of

- Most ovhds. (slew, acquisition, A&G, …) are not accounted for.
  - Only beam switch / nodding sky-object + det read-out
- Calculations are based on "coherence time" between:
  - object-sky / ABBA obs
  - Dither pattern
- So,
  - Cannot take result to determine exact duration
    - Only GTC can
  - If det. int. time set are much changed, the coherence is lost
    - Bad sky subtraction

Ex. 1: fixed Tsrc, no limits



No limit to default Tint set

Default values

Obs. configuration

Check this!

Ex. 1: cont

Total Exp time: 1920 :

Tmax: 0 **Tmin** 0

Filter or Grism: Imaging: Brg

Dither points: 4 **Separated sky observation**

Calculate

Result

```
 SKY:  0 Tcoh:   300. Tmax:   30. Tmin:   1.5 Npoint:  4
 Niter:  8 Nexp:  2 Tdith:   30.
Tsource_e:  1920 Ttot:  2151  Efi: 89.26
 Tsource_e  Ttot   Efi  Niter Nexp Tdith
    1680    1882  89.26    7    2   30.0
    1920    2151  89.26    8    2   30.0
    2160    2420  89.26    9    2   30.0
    1680    1912  87.87    7    3   20.0
    1920    2185  87.87    8    3   20.0
    2160    2458  87.87    9    3   20.0
    1680    1942  86.53    7    4   15.0
    1920    2219  86.53    8    4   15.0
    2160    2496  86.53    9    4   15.0
    1680    1980  84.83    6    7   10.0
    1960    2311  84.83    7    7   10.0
```

Ex. 2: Tsrc interval, no limit

Total Exp time: 1750 : 2100

Tmax: 0 **Tmin** 0

Filter or Grism: Imaging: Brg

Dither points: 4 **Separated sky observation**

Calculate

Result

```
 SKY:   0 Tcoh:    300. Tmax:    30. Tmin:    1.5 Npoint:   4
 Niter:   8 Nexp:   2 Tdith:    30.
Tsource_e:   1920 Ttot:   2151  Efi: 89.26
 Tsource_e   Ttot    Efi   Niter Nexp Tdith
    1680     1882   89.26     7     2   30.0
    1920     2151   89.26     8     2   30.0
    2160     2420   89.26     9     2   30.0
    2400     2689   89.26    10     2   30.0
    1680     1912   87.87     7     3   20.0
    1920     2185   87.87     8     3   20.0
    2160     2458   87.87     9     3   20.0
    2400     2731   87.87    10     3   20.0
    1680     1942   86.53     7     4   15.0
    1920     2219   86.53     8     4   15.0
    2160     2496   86.53     9     4   15.0
```

Ex. 3: time limit

Total Exp time: 120 : 0

Tmax: 0 **Tmin** 0

Filter or Grism: Imaging: Brg

Dither points: 4 **Separated sky observation**

Calculate

Result

```
 SKY:  0 Tcoh:   300. Tmax:   30. Tmin:   1.5 Npoint:  4
 Niter:  1 Nexp:  1 Tdith:   30.
Tsource_e:   120 Ttot:   145  Efi: 82.96
 Tsource_e  Ttot   Efi  Niter Nexp Tdith
     120     145  82.96    1     1   30.0
     120     149  80.60    1     2   15.0
     120     153  78.37    1     3   10.0
     128     165  77.41    1     4    8.0
     108     141  76.53    1     3    9.0
     112     149  74.99    1     4    7.0
     120     162  74.26    1     5    6.0
     120     166  72.36    1     6    5.0
     120     169  70.89    2     1   15.0
     128     182  70.21    1     8    4.0
     112     162  69.10    1     7    4.0
```

Ex. 3: time limit

Total Exp time: 120 : 0

Tmax: 20 **Tmin** 0

Filter or Grism: Imaging: Brg

Dither points: 4 **Separated sky observation**

Calculate

Result

```
 SKY:  0 Tcoh:   300. Tmax:   20. Tmin:   1.5 Npoint:  4
 Niter:  1 Nexp:  2 Tdith:   15.
Tsource_e:   120 Ttot:   149  Efi: 80.60
 Tsource_e  Ttot   Efi  Niter Nexp Tdith
     120     149  80.60    1     2   15.0
     120     153  78.37    1     3   10.0
     128     165  77.41    1     4    8.0
     108     141  76.53    1     3    9.0
     112     149  74.99    1     4    7.0
     120     162  74.26    1     5    6.0
     120     166  72.36    1     6    5.0
     120     169  70.89    2     1   15.0
     128     182  70.21    1     8    4.0
     112     162  69.10    1     7    4.0
     128     186  68.91    2     2    8.0
```

Ex. 3: time limit

Total Exp time: 120 : 0

Tmax: 20 **Tmin** 20

Filter or Grism: Imaging: Brg

Dither points: 4 **Separated sky observation**

Calculate

Result

```
 SKY:   0 Tcoh:    300. Tmax:    20. Tmin:    20. Npoint:   4
 Niter:   1 Nexp:   2 Tdith:    20.
Tsource_e:    160 Ttot:    189  Efi: 84.71
 Tsource_e  Ttot   Efi  Niter Nexp Tdith
     160     189  84.71    1    2   20.0
      80     105  76.45    1    1   20.0
     160     209  76.45    2    1   20.0
```

Ex 4.: time limit

Total Exp time: 1200 : 0

Tmax: 0 **Tmin** 360

Filter or Grism: Imaging: Brg

Dither points: 4 **Separated sky observation**

Calculate

Result

```
 SKY:  0 Tcoh:   300. Tmax:   360. Tmin:   360. Npoint:  4
 Niter:  1 Nexp:  1 Tdith:   360.
Tsource_e:  1440 Ttot:  1465  Efi: 98.32
 Tsource_e  Ttot   Efi  Niter Nexp Tdith
```

Conclusions

- Always play with this tool before setting the observing parameters

- Use Tmin / Tmax with great caution
  - Try no to alter Coherence time
    - More important if more red