

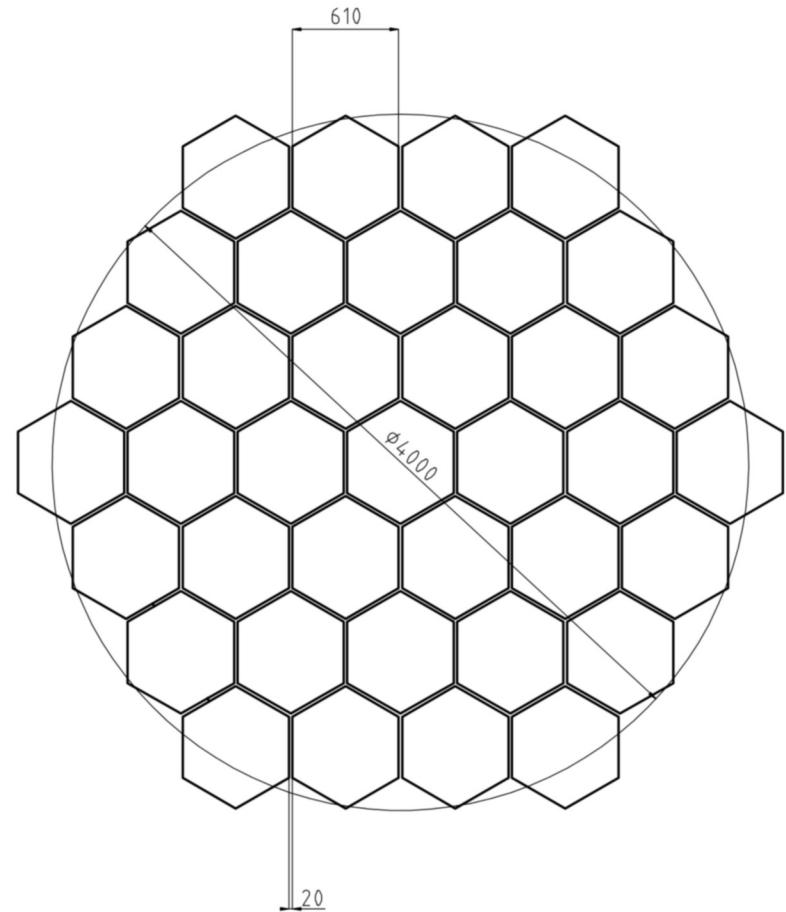
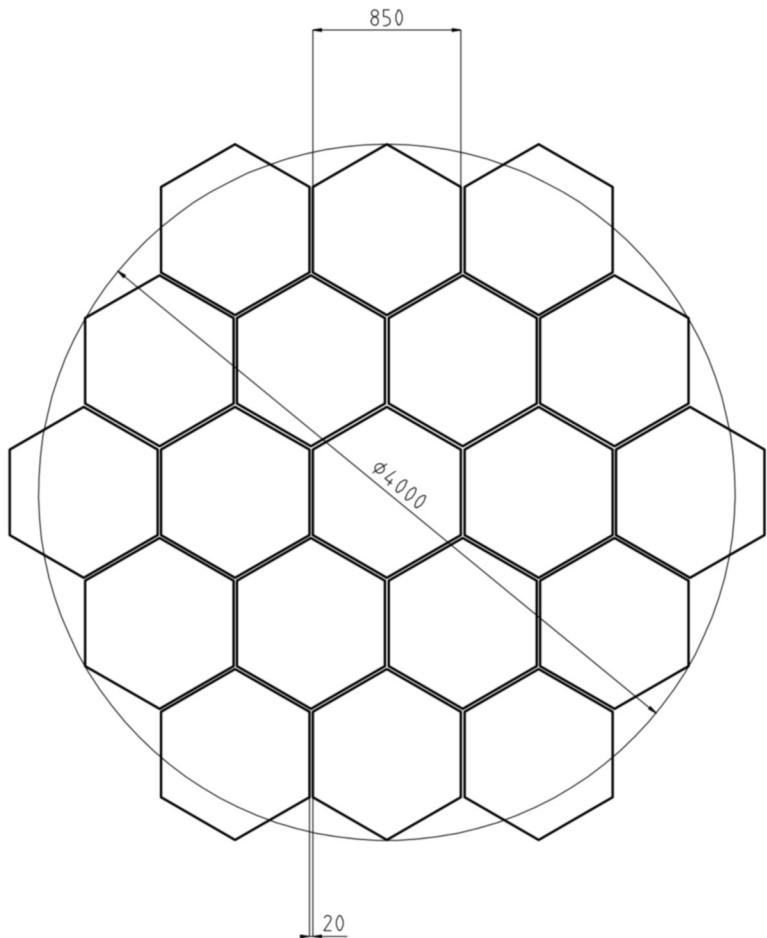
PSF STUDIES

- `plot_mirrors.c` – standard script to generate mirror configuration
- `sim_telarray` – use ray-tracing to obtain photon distribution of the single star in the focal plane
- D_{80} – diameter of the circle containing 80% of the photons

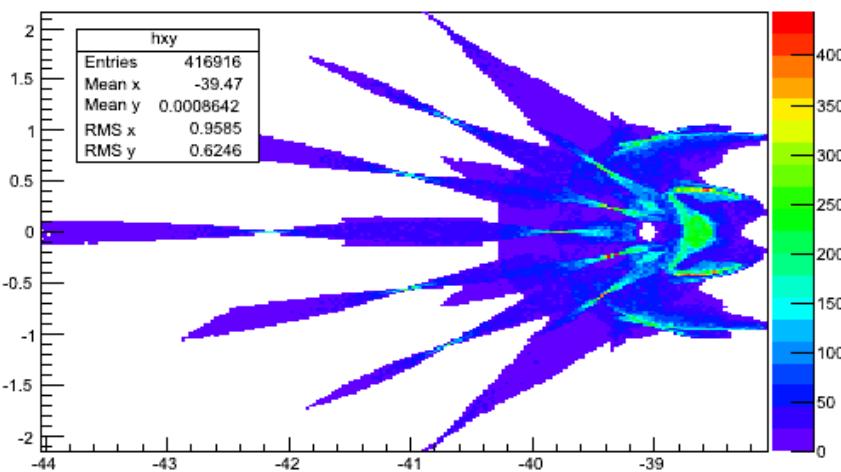
Requirement:

80% containment diameter for the SST shall be less than 0.25deg within 4deg from the optical axis.

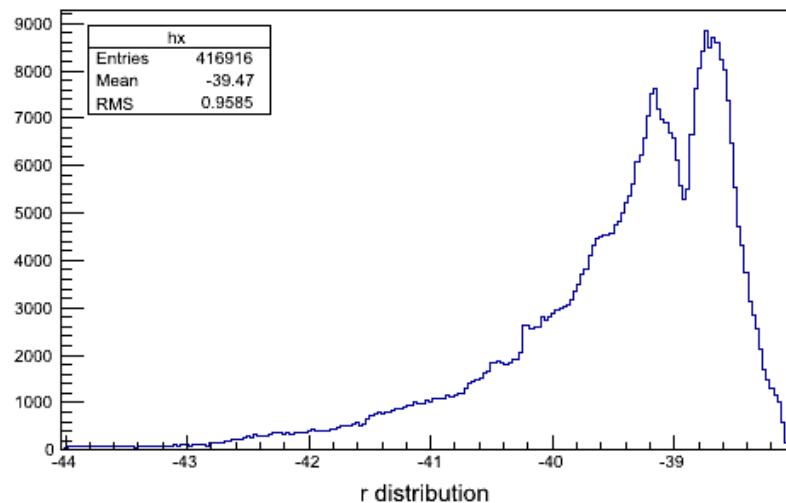
4m DC SST Point Spread Function (Cracow mirrors)



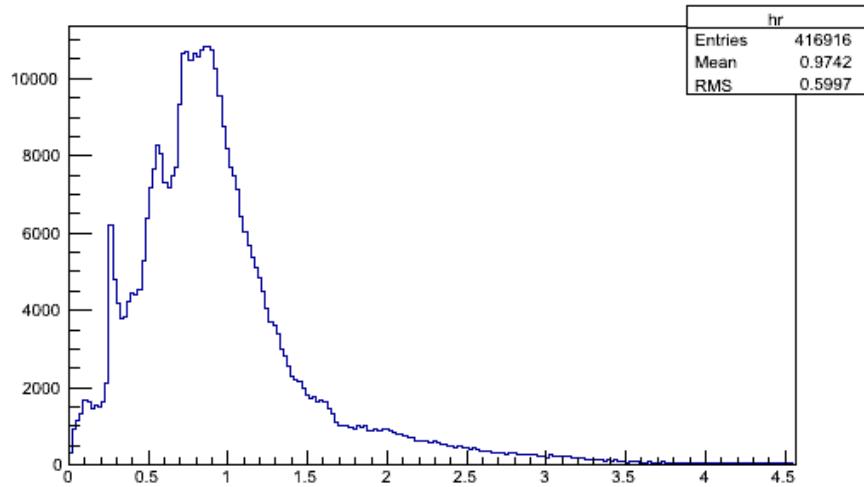
2D distribution



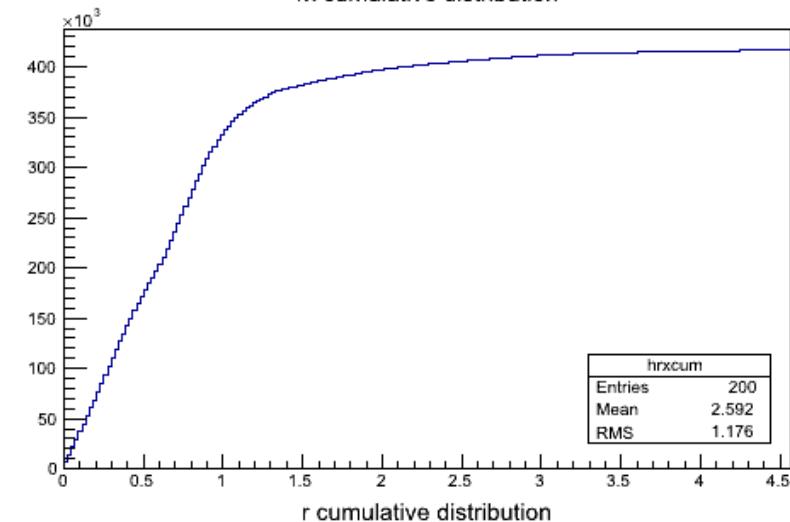
x distribution



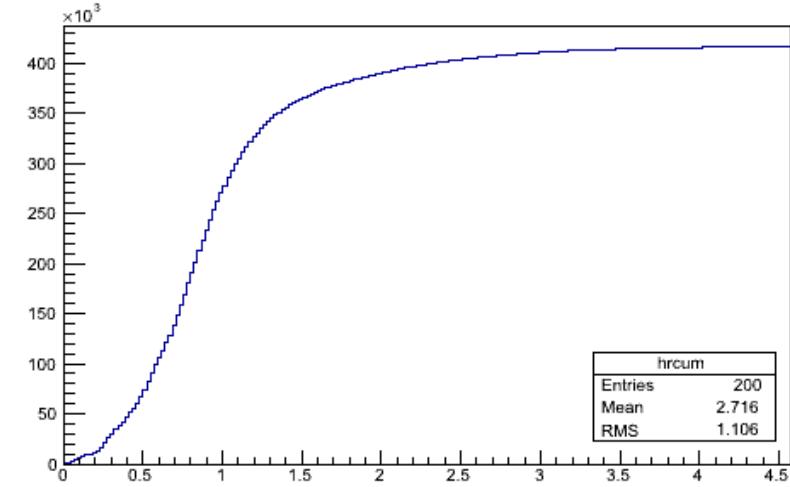
r distribution



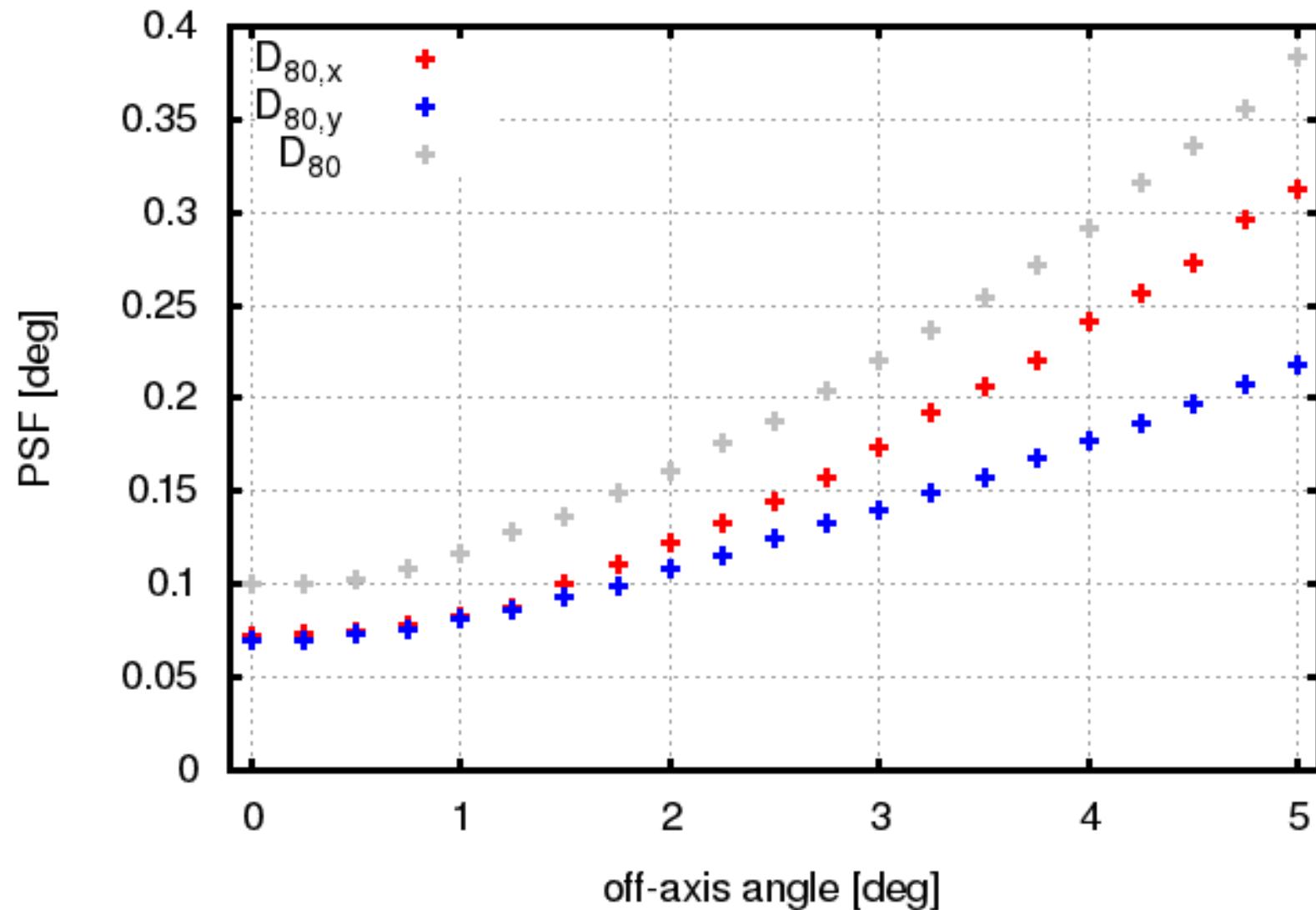
rx cumulative distribution



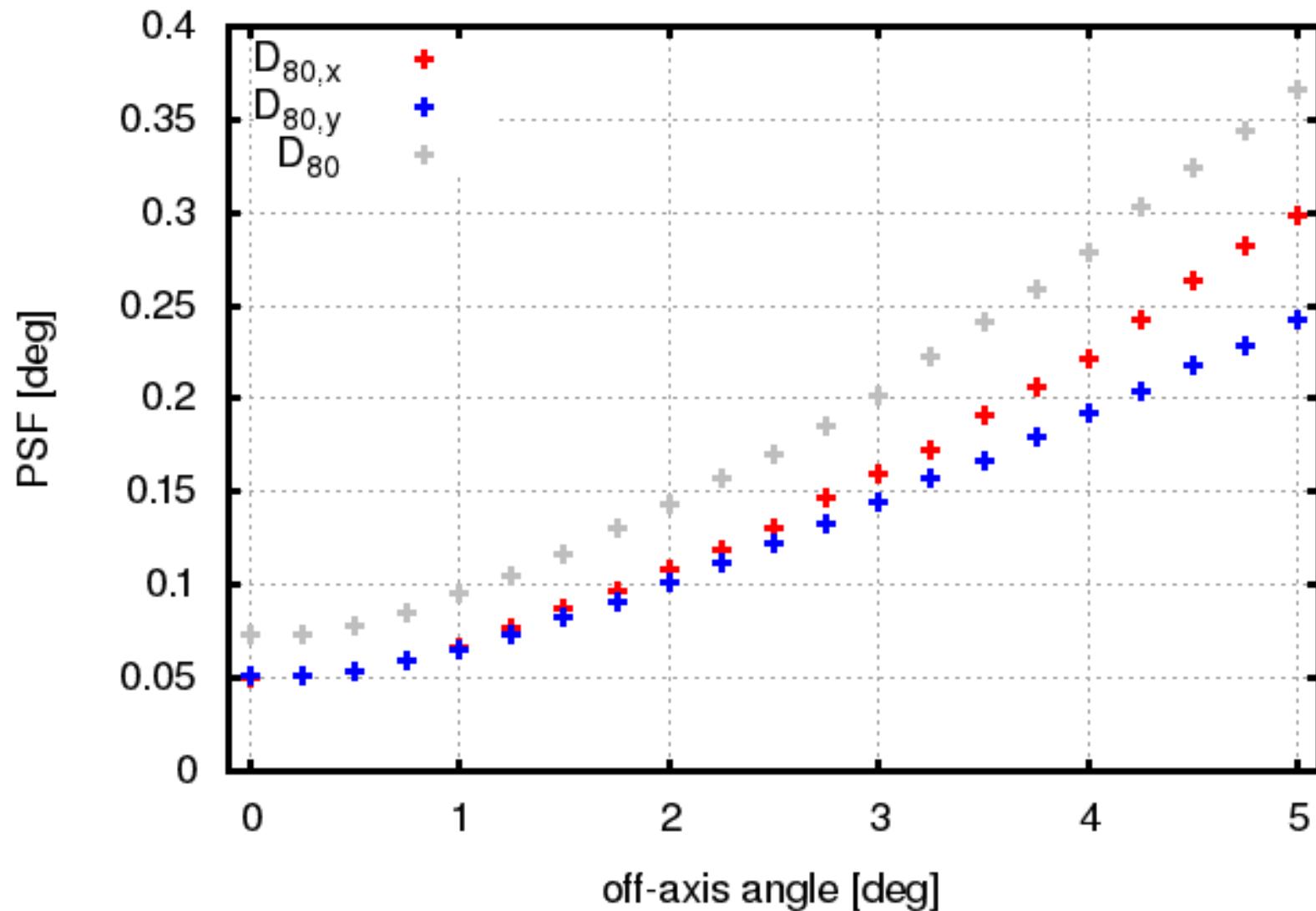
r cumulative distribution



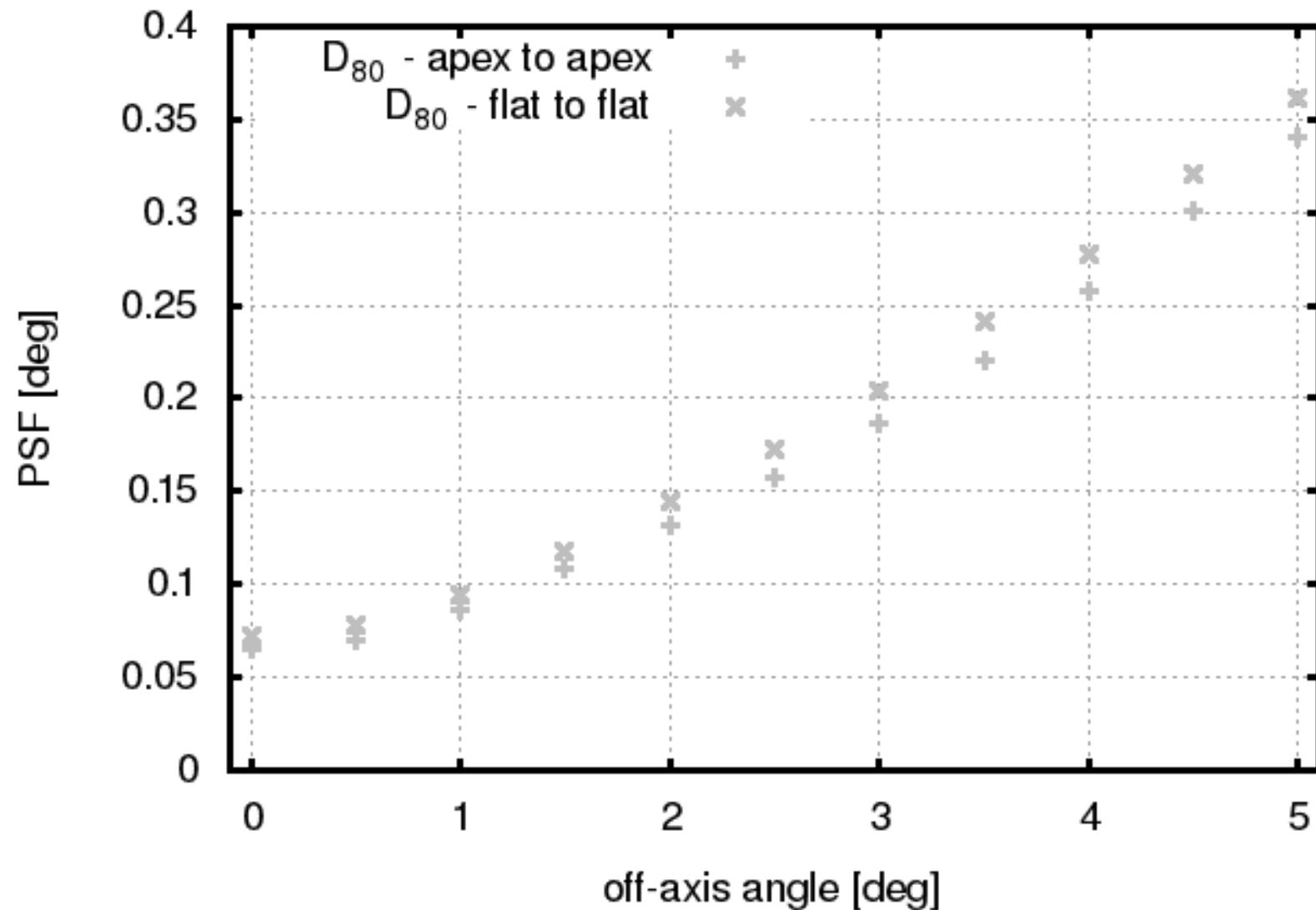
4m DC SST PSF - 85cm mirror tiles (2cm spacing)



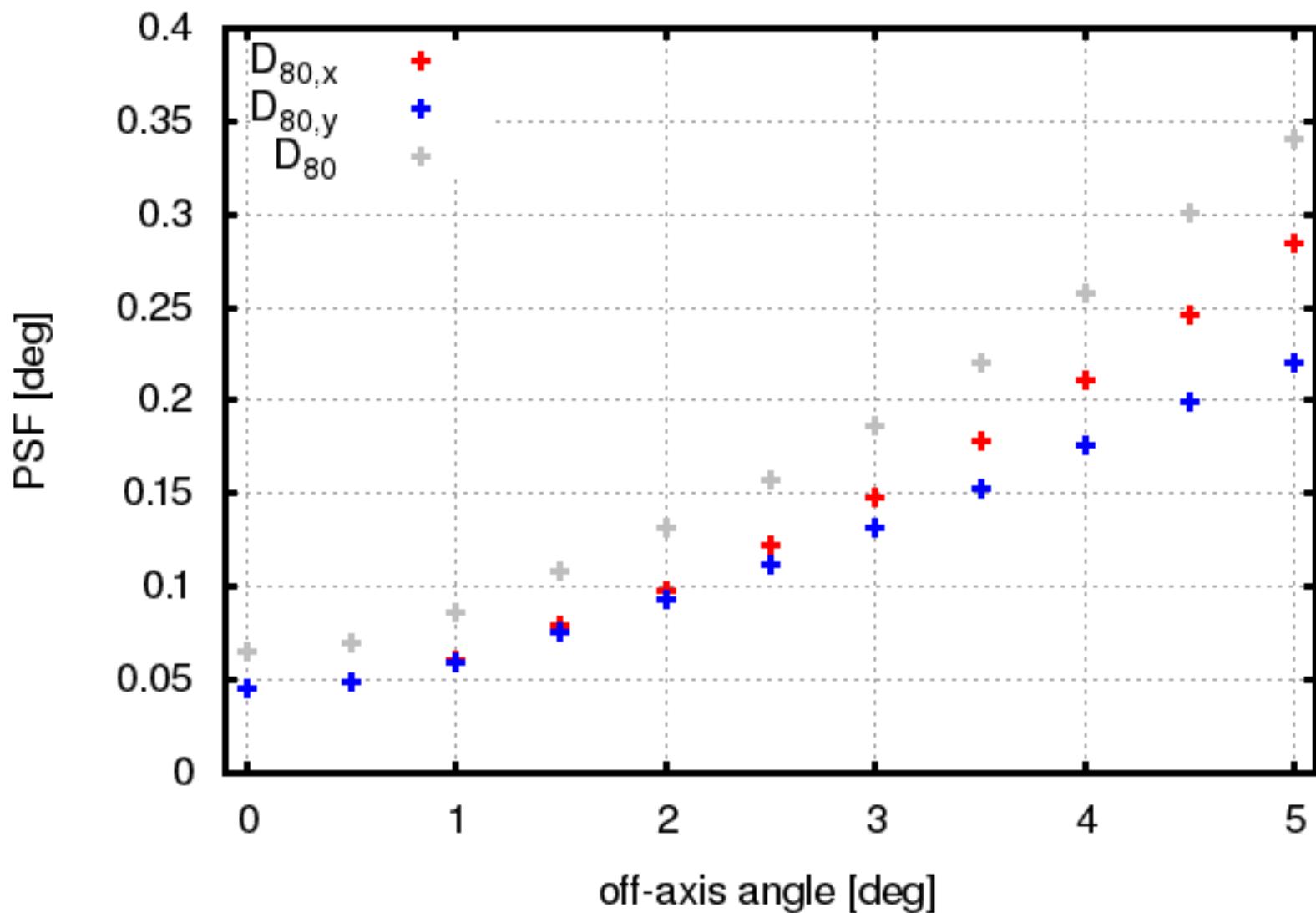
4m DC SST PSF - 61cm mirror tiles (2cm spacing)



4m DC SST PSF - 61cm mirror tiles (2cm spacing)



4m DC SST PSF - 60cm mirror tiles



24 mirror configurations: from 54cm to 100cm flat-to-flat (2cm spacing).

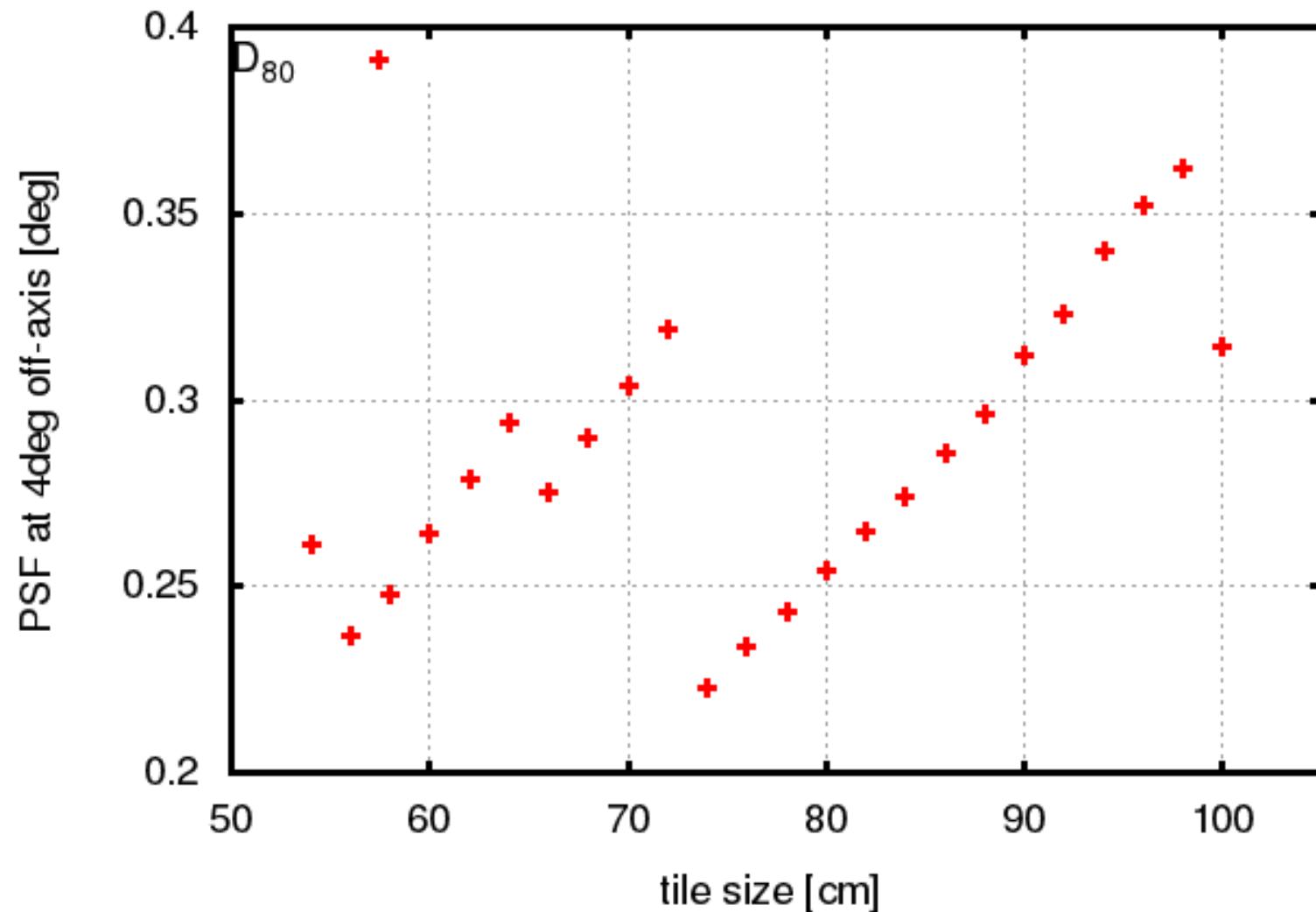
Mirror configuration files available in SVN repo:

<http://ui.cta.camk.edu.pl/config/>

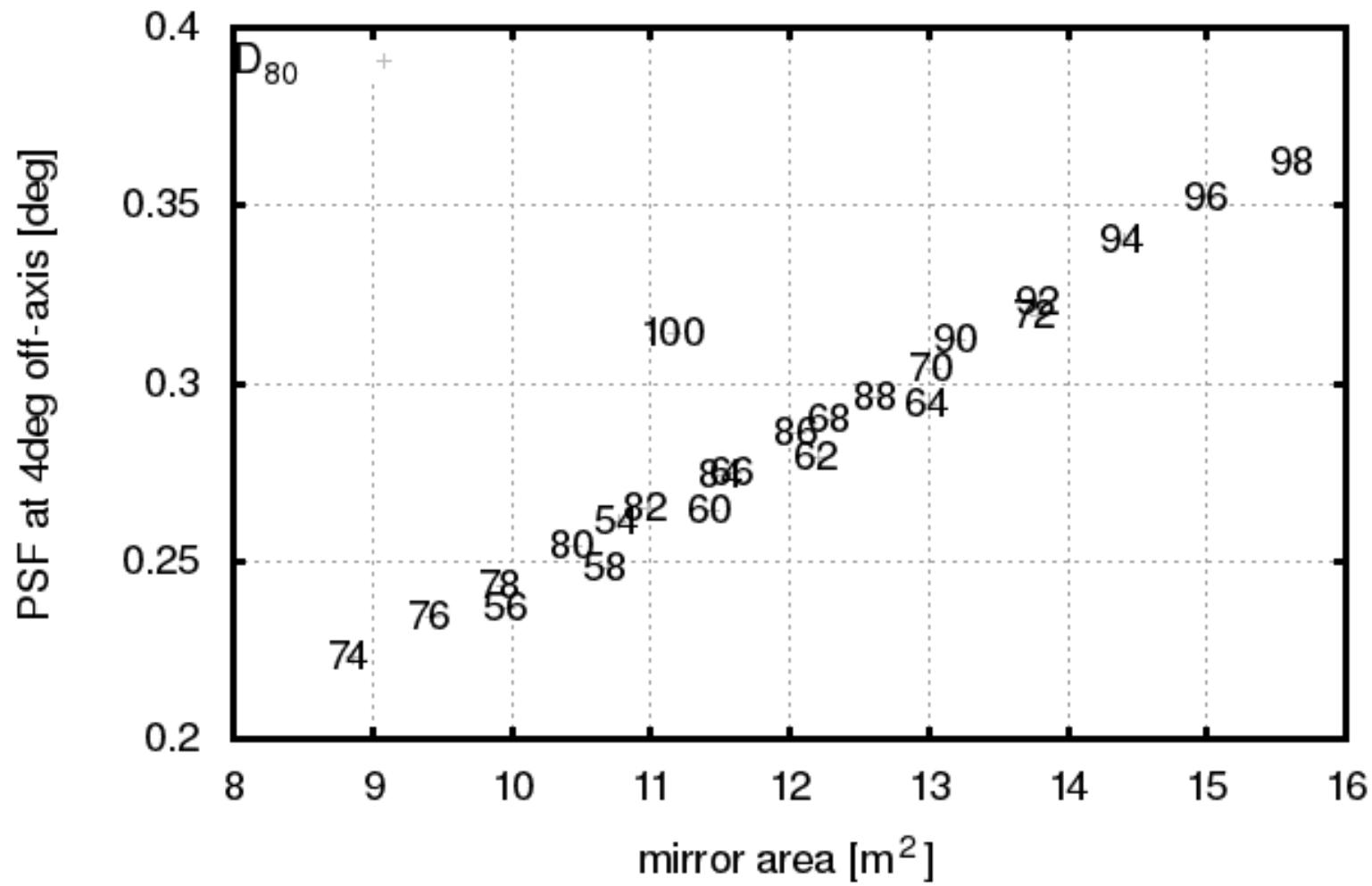
Filenames:

mirror_DCSST_4m_78cm_sep2cm.dat

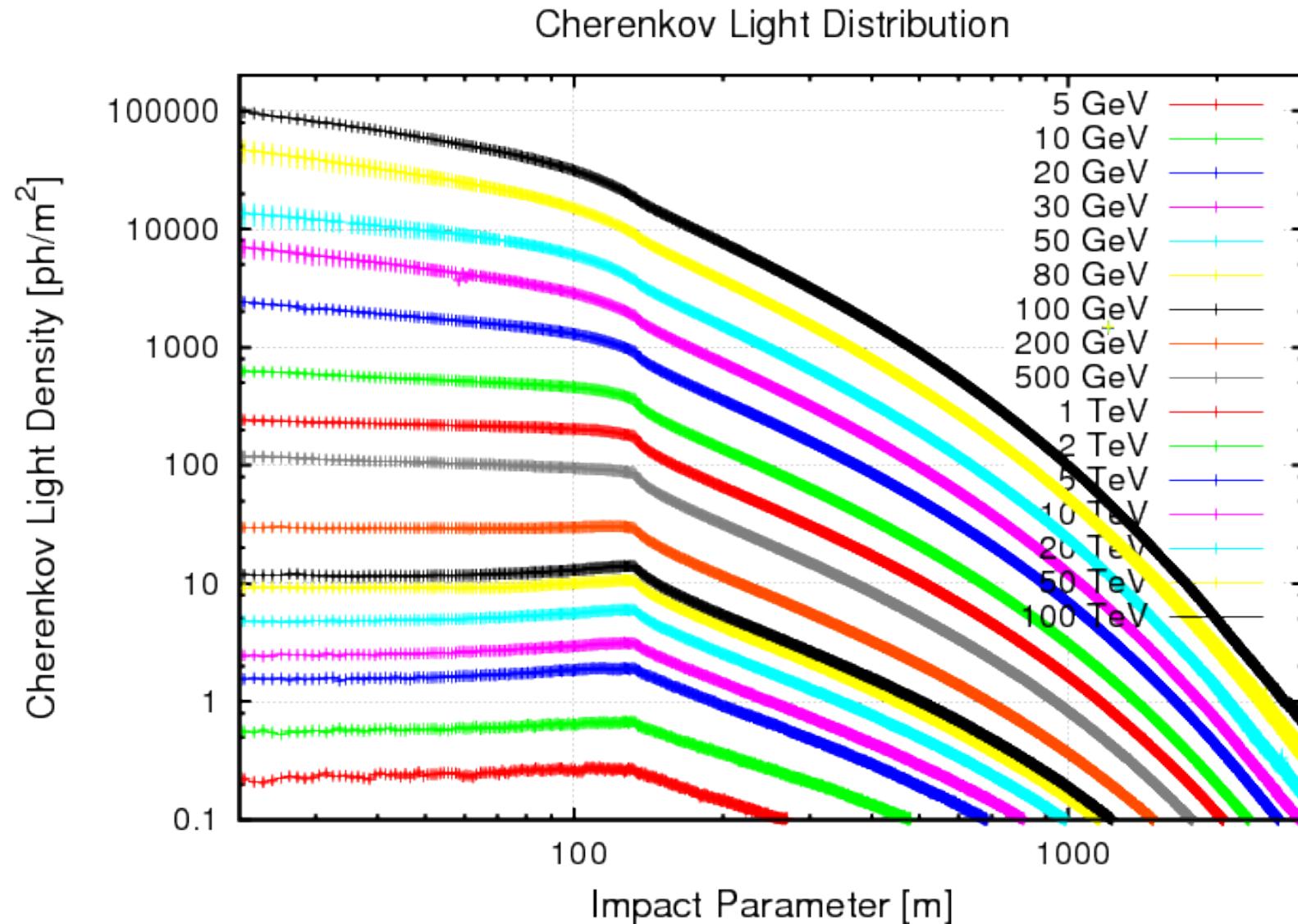
4m DC SST PSF



4m DC SST PSF



Energy threshold



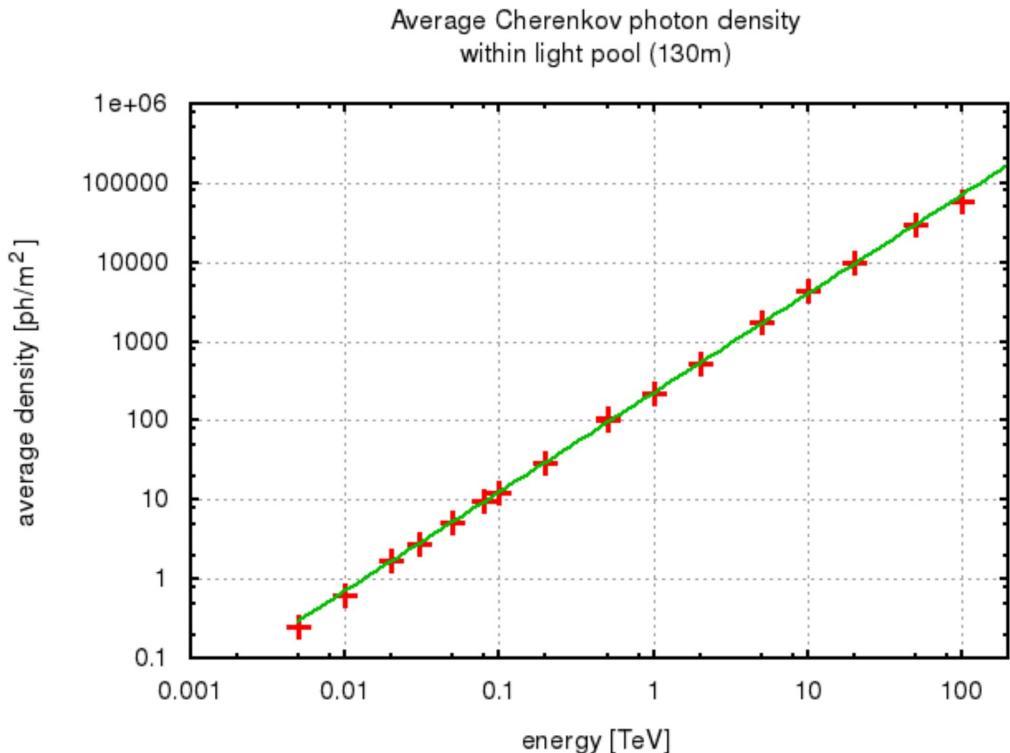
**4m DC SST (9° FOV, 22mm/0.225deg pixel)
78 cm tile (2cm spacing)**

mirror effective area A [m ²]	9.9
camera shadowing A _C [m ²]	0.6
collecting area (A-A _C) [m ²]	9.3
system reflectivity R	0.81
photodetector QE	0.45
focal plane filling factor f	0.9

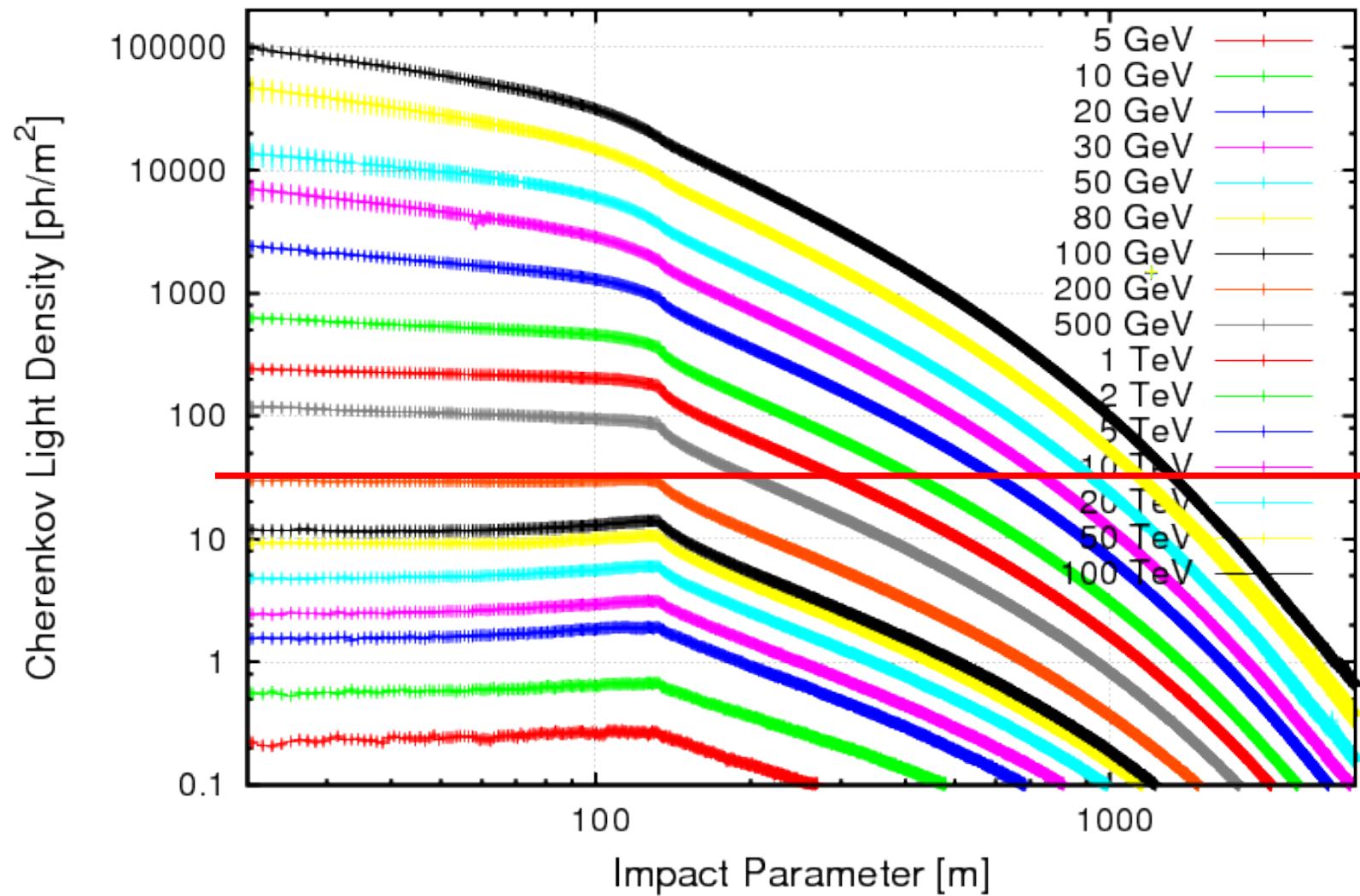
required number of photoelectrons N _{PE} [PE]	100
required photon density [ph/m ²]	33

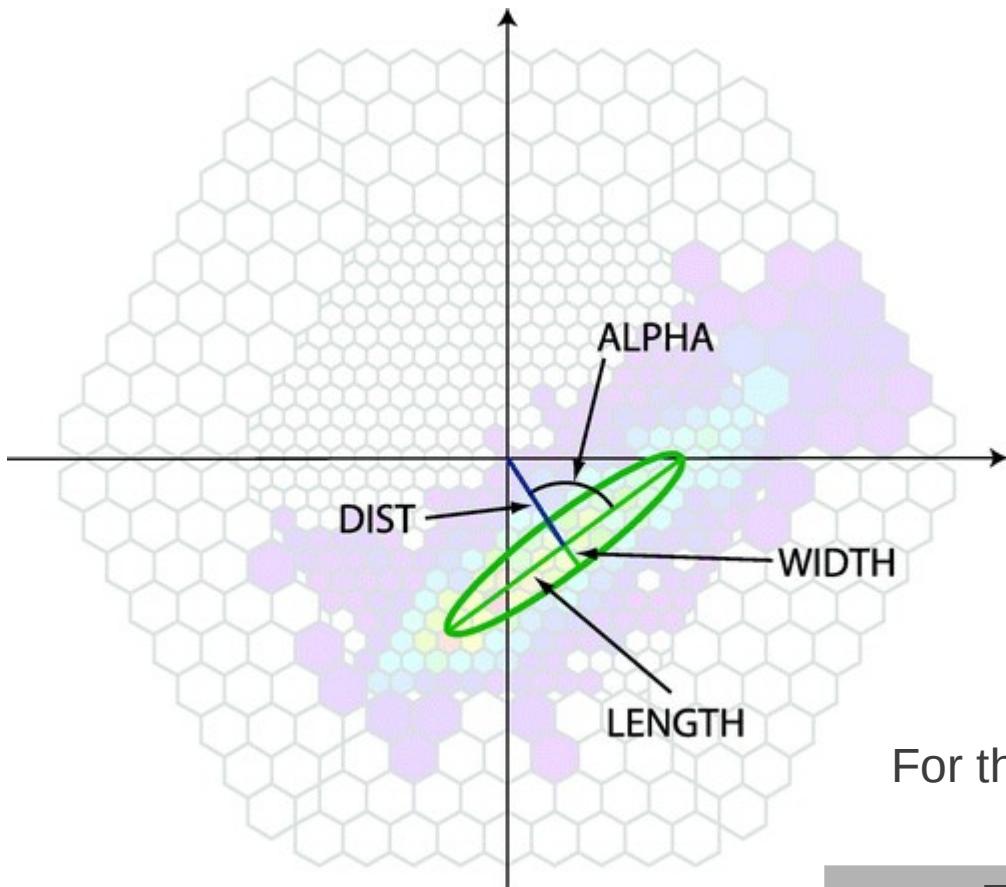
energy threshold [TeV] **0.217**

$$\rho_{ph} = \frac{N_{PE}}{(A - A_C) \times R \times QE \times f}$$



Cherenkov Light Distribution





For the shower maximum at 10km:

FOV [deg]	max core distance[m]
8	700
9	790
10	875