

## Antenna

The 100-m telescope has a Gregorian design with a 100-m primary mirror (a paraboloid) and a 6.5-m secondary mirror (an ellipsoid).

The prime mirror has a surface accuracy (rms) of about 0.55mm (best value) and follows a homologous design - this means that it maintains a parabolic shape at any given elevation (but always a different one!).

The secondary mirror (which was replaced in 2006) has a surface error of only 60  $\mu\text{m}$ . Additionally, its surface is equipped with 96 actuators, so that it can (partially) compensate incomplete homologous structures of the main dish (for observations from the secondary focus).

The telescope is located at

Longitude 6°53'01.0" East (6.88361°),  
Latitude 50°31'29.4" North (50.52483°);

the Altitude (track level/elevation axis) is 319/369m. These positions are based on [http://www.ccivs.bkg.bund.de/EN/Quarterly/VTRF-Results/VTRF-Stations/vtrf-stations\\_node.html](http://www.ccivs.bkg.bund.de/EN/Quarterly/VTRF-Results/VTRF-Stations/vtrf-stations_node.html) of the International VLBI Service for Geodesy & Astrometry (IVS) (Reference frame is the Earth ellipsoid defined by WGS84).

### Axis limits / Cable wrap

The Effelsberg telescope has an altazimuth-mount, with the limits:

$33.5^\circ \leq \text{Azi} \leq 503^\circ$  ( $0^\circ$  is North)

$8.1^\circ \leq \text{Elv} \leq 89^\circ$

With the lower elevation limit of  $08^\circ 6'$ , the theoretical declination limit is  $-31^\circ 22'$ . In practice, observations below  $-31^\circ 0'$  do not really make sense.

Table of source visibilities:

Source declination [deg]	Visibility [hrs]	max. Elevation [deg]
0	8.8	39.5
-5	8.2	34.5
-10	6.6	29.5
-15	5.6	24.5
-20	4.4	19.5
-25	3.2	14.5
-30	2.1	9.5
-31	1.0	8.5

In addition, please note, that Effelsberg is located in a valley, hence, for a given declination the real visibility is somewhat smaller than the theoretical one. The optical horizon as seen from the lower edge of the telescope is shown in the figure. Although observations below the red line lead to a partly shadowed reflector and an increased system temperature, it is possible to observe sources at lower elevations without much loss at frequencies below 10 GHz. At higher frequencies the increase in Tsys

in more severe. As reference we show here also the horizons that represent a 5K and 10K access to the 6cm system temperature with respect to the increase you would expect from airmass. They were measured using skydips at 6cm wavelength at different azimuth directions. The VLBI SCHED catalog has an even lower horizon to allow a maximum VLBI observing time with stations in the east or west.



From:  
<https://eff100mwiki.mpifr-bonn.mpg.de/> - **Effelsberg 100m Teleskop**

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Last update: **2016/06/28 08:54**

