ROT 54/2.6: Unheard Telescope from Armenia

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Extended Abstract. The Radio-Optical Telescope (ROT-54/2.6) was designed and constructed during 1975-1985 by All union Scientific Research Institute on Radio physical Measurements (VNIIRI, Yerevan, Armenia) on territory of VNIIRI Aragats Scientific Centre (ASC, 100 ha) on Mount Aragats (Armenia) at altitude 1700m. The ROT-54/2.6 includes the Radio telescope with Double Reflector Spherical Antenna of 54m in diameter and the Optical Telescope with diameter of mirror 2.6m and focus distance of 10m.
The main advantages of ROT Antenna are the highest accuracy of mirror surfaces (50 micron), shortest wavelength (1mm predicted) and very low level of Self Noises (2,8 K), i.e. highest sensitivity. Parameters of the Antenna were measured in 1985-1990[1].
The Large Antenna of ROT has a special design [1]. Its Main mirror (54m) is fixed in ground and has hemispheric shape. Using aperture is 32m in diameter. The spherical aberrations of Main mirror are recompensed by special shape of Secondary mirror of 5m in diameter, which can rotate around the center point of Main mirror.
Its due to accuracy of ROT Antenna, why it can work in very short wavelengths, down to 1mm. Due to special optical scheme of the Antenna, the diffraction rays from edges of mirrors do not arrive to the focus point, so Antenna almost does not feel surrounding high temperature (about 300 K). So the Self Noises of Antenna is very low, just about 2.6 K or 2.8 K (±10%) in different experiments [1]. As the ROT-54/2.6 has a low antenna temperature, its radio-noise will not exceed the level of 1-2 mJy, if the receiver has the band pass of 1 GHz and the integration time of 1 sec. The radio telescope will enable to study very weak objects (the sensitivity of VLA is in the same order) [2]. For space objects it is possible to do the simultaneous radio and optical observations. The arrangement is shown on Fig. 1. [1].

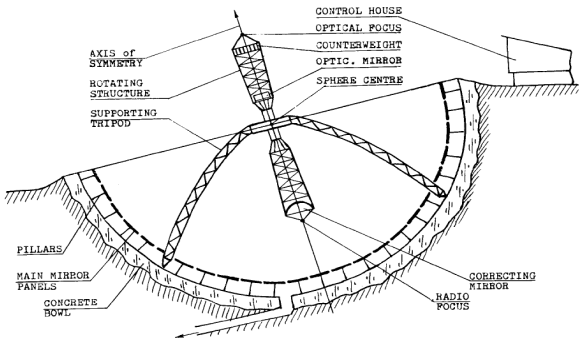

Figure 1. Arrangement of Radio-Optical Telescope ROT-54/2.6.

The theoretical and experimental studies on the Antenna (mainly, measuring the antenna parameters, and in small amounts – radio-astronomical observations) during the past 25 years have been carried out under the conditions of very limited funding, mainly due to the enthusiasm of scientists and the staff. Since 2012 the unique tool ROT-54/2.6 was not used as intended because of the lack of financial means.
Revitalization of the ROT is a subject of the Herouni United Space Center (HUSC) Project now. The spherical main reflector is in a very reasonable state, with perspective for further improvement. Currently the East-West axis is blocked on purpose with welded brackets. A careful inspection is needed.

References

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[2] J. M. Martin, C. Rosolen,"Perspectives of the ROT 54/32/2.6 in astronomy", *ASTROPHYSICS*, **vol. 4**/38, Nov. 1995, pp. 645-648.