

## RECOMMENDATION ITU-R RA.1272-1

**Protection of radio astronomy measurements above 60 GHz  
from ground based interference**

(Question ITU-R 145/7)

(1997-2002)

The ITU Radiocommunication Assembly,

*considering*

- a) that a large number of atomic and molecular spectral lines are found at frequencies above the 60 GHz oxygen absorption band, and that many of these lines are of great importance to astronomy but only a few fall within bands allocated to radio astronomy;
- b) that these spectral lines along with continuum observations provide unique information about star formation, including the formation of planets in other solar systems, the existence of pre-biological molecules and extraterrestrial life, the physics and chemistry of the interstellar medium, the history of the early Universe, and about other astrophysical processes of great interest;
- c) that Doppler shifted spectral lines of great interest for the study of the early Universe have been detected at frequencies well outside the bands allocated to radio astronomy;
- d) that mm-wave radio astronomy receivers are designed to cover the full width of the atmospheric windows (68-116 GHz, 130-170 GHz, 200-323 GHz, etc.) to take advantage of the information contained in many spectral lines;
- e) that the superconductor-insulator-superconductor (SIS) mixers employed as first stages of these extremely sensitive receivers are highly susceptible to saturation and even to destruction by interfering signals from anywhere in the band they cover and that low loss filter technology to protect them is not yet available;
- f) that there is extensive development being carried out to provide telecommunication services at mm-wavelengths, e.g. for the transmission of large volumes of data, and for mass market devices such as vehicular radars;
- g) that sharing between radio astronomy observatories and ground based transmitters is facilitated in the mm-wave spectral region by topography, by the oxygen absorption bands, and by the natural attenuation provided by atmospheric gases;
- h) that there are only a small number of mm-wave observatories operating worldwide;
- j) that several large new mm- and submm-wave telescopes, which will incorporate the most advanced technology, are planned or are under construction in various parts of the world, and that they represent large collaborative scientific investments by the participating countries;
- k) that mm-wave observatories are, whenever practicable, located at isolated, remote locations, to take maximum advantage of extremely dry atmospheric conditions and a low level interference environment;

l) that Recommendation ITU-R RA.769 contains the protection criteria used for radio astronomical measurements,

*noting*

a) that *considering* g) to k) facilitate the effective protection of mm-wave observatories from ground based transmissions at **all** frequencies above 60 GHz by means of coordination zones of modest size, with minimal disruption to ground based services,

*recommends*

**1** that coordination zones be established around mm-wave astronomical observatories, for all frequencies above 60 GHz where practicable;

**2** that the threshold levels of interference detrimental to radio astronomy of Tables 1 and 2 in Recommendation ITU-R RA.769 be used to define coordination zones for observations in the frequency range between 71 and 275 GHz, following the procedure outlined in Recommendation ITU-R RA.1031.

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