

Radio-Quiet Zones

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Abstract

In order to protect a radio observatory from radio frequency interference we need a package of measures to deal with the many different aspects of the problem. We need regulatory protection at the highest level, we need strong local protection, and finally we need self-protection through interference mitigation techniques. The International Telecommunication Union provides regulatory protection from licensed radio transmitters, through the allocation of passive frequency bands, through limits to unwanted emissions, and so on. The ITU process of coordination can be used to safeguard radio astronomy in shared frequency bands, by keeping radio transmitters at calculated distances from an observatory. At mm-waves it is feasible to coordinate transmitters at all frequencies, not just those allocated to radio astronomy. Such a coordination zone is being negotiated for ALMA. The ITU-R Recommendations on radio astronomy also draw attention to two naturally quiet zones in space: the shielded zone of the Moon, and the Sun-Earth Lagrangian point L_2 . Terrestrial radio observatories also need local protection against electrical devices not commonly recognized as radio transmitters ranging from heavy machinery to consumer electronics, which are outside the remit of the ITU. A radio-quiet zone (RQZ) can be set up locally using state or national law to restrict housing and industrial developments in the vicinity of a radio observatory and to restrict the use of electrical equipment. The largest and best known such radio-quiet zone is that about Green Bank (described elsewhere in this volume). It is noteworthy that this RQZ was set up before the large radio telescopes were built at the site, and indeed before there were any frequency bands allocated to radio astronomy. Future large facilities, such as the Square Kilometer Array, will require a new type of international RQZ to gain access to much more of the spectrum than the officially allocated bands, and to receive protection from transmitters on satellites. The OECD Task Force on Radio Astronomy and the Radio Spectrum has considered this issue. The report of this task force is expected to recommend among other things the early identification of a small number of sites for International RQZs, with a view to getting protection for these sites onto the agenda for WRC-07.

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