

Future Challenges for Radio Astronomy

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The challenge of maintaining quiet skies for radio astronomy continues to evolve rapidly, as it has done for the past 50 or more years. Increased emissions from electronics devices, increased power, ready embedding of digital and wireless electronics, and the increased power and frequency agility of many transmitters combine to make the successful scientific operation of any radio astronomy telescope challenging. This is compounded by the increasing desire to observe outside of the radio astronomy protected bands, e.g. to perform broadband pulsar observations, or to observe redshifted HI.

The National Radio Astronomy Observatory in Green Bank, West Virginia, maintains two radio quiet zones - the 13,000 square mile national radio quiet zone and the 10 mile radius West Virginia Radio Astronomy Zone. As society assimilates increasing numbers of electronic devices and their associated communications technologies, maintaining the radio quiet zones for astronomers is increasingly challenging. Examples of this include the Federally mandated switch to LED lighting, the increased use of electronics, including radar and Wi-Fi, in automobiles; the increased number of satellites with strong transmissions, and the increased power frequencies of many transmitters.

These problems are ameliorated to some extent by new techniques in receiver technology (phased arrays) and improved radio frequency interference mitigation techniques, which will aid radio astronomy observations in an environment where these electronic transmissions are present.

Here we highlight some of the upcoming challenges which will be faced by astronomers world-wide, even within the protected radio quiet zones, as well as some of the possible paths forward.