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Jupiter's polarized synchrotron radiation: from Earth's and Juno's measurements to theoretical modeling

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Abstract

Since late August 2016, measurements of Jupiter's microwave radiation have been taken at high data rates with the Microwave Radiometer (MWR) instrument during Juno's passes at the planet. In addition to providing unprecedented measurements of the planet's thermal emission at $\sim$1-50 cm wavelengths, Jupiter's electron-belt synchrotron emission has also been measured with high resolution for +90 to -90 degrees latitude within 2 R_J from the planet and from inside/outside the electron-belt region. We report results and analyses of MWR data sets for the first science passes to interpret the measurements of the synchrotron radiation's linear components from a wide range of points of view. Our ability to simulate the polarized components of Jupiter's synchrotron radiation is first evaluated with Very Large Array observations of Jupiter at different radio bands. We present our data processing and reconstructions of polarized maps of Jupiter's synchrotron radiation. The simulated polarized maps are compared to Earth-based observations.

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