

The Radio & Plasma Wave Investigation (RPWI) for JUICE – Instrument Concept and Capabilities

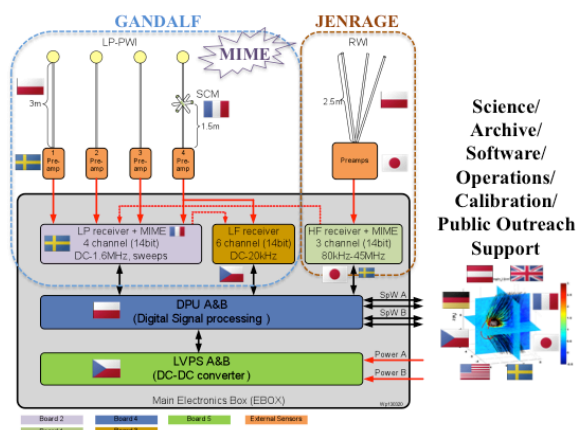
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1. Abstract

We present the concept and capabilities of the Radio & Plasma Waves Investigation (RPWI) instrument for the JUICE mission. The RPWI instrument provides measurements of plasma, electric- and magnetic field fluctuations from near DC up to 45 MHz. The RPWI sensors are four Langmuir probes for low temperature plasma diagnostics and electric field measurements, a three-axis searchcoil magnetometer for low-frequency magnetic field measurements, and a three-axial radio antenna, which operates from 80 kHz up to 45 MHz and thus gives RPWI remote sensing capabilities. In addition, active mutual impedance measurements are used to diagnose the *in situ* plasma. The RPWI instrument is unique as it provides vector field measurements in the whole frequency range. This makes it possible to employ advanced diagnostics techniques, which are unavailable for scalar measurements. The RPWI instrument has thus outstanding new capabilities not previously available to outer planet missions, which enables RPWI to address many fundamental planetary science objectives, such as the electrodynamic influence of the Jovian magnetosphere on the exospheres, surfaces and conducting oceans of Ganymede, Europa, and Callisto. RPWI will also be able to investigate the sources of radio emissions

from auroral regions of Ganymede and Jupiter, in detail and with unprecedented sensitivity, and possibly also lightning. Moreover, RPWI can search for exhaust plumes from cracks on the icy moons, as well as μm -sized dust and related dust-plasma-surface interaction processes occurring near the icy moons of Jupiter. The top-level blockdiagram of the RPWI instrument is shown here. A detailed technical description of the RPWI instrument will be given.



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