Mesure du diagramme des émissions décamétriques Io-Jupiter : un diagnostic de l'interaction planète-satellite

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Résumé

We investigate the beaming of 11 Io-Jupiter decametric (Io-DAM) emissions observed by Juno/Waves, the Nan cay Decameter Array and NenuFAR. Using an up-to-date mag- netic field model and three methods to position the active Io Flux Tube (IFT), we ac- curately locate the radiosources and determine their emission angle
theta from the local mag- netic field vector. These methods use (i) updated models of the IFT equatorial lead an- gle, (ii) ultraviolet (UV) images of Jupiter's aurorae and (iii) multi-point radio measure- ments. The kinetic energy Ee– of source electrons is then inferred from

theta in the frame- work of the Cyclotron Maser Instability. The precise position of the active IFT achieved from methods (ii,iii) can be used to test the effective torus plasma density. Simultane- ous radio/UV observations reveal that multiple Io-DAM arcs are associated with mul- tiple UV spots and provide the first direct evidence of an Io-DAM arc associated with a trans-hemispheric beam UV spot. Multi-point radio observations probe the Io-DAM sources at various altitudes, times and hemispheres. Overall,
theta varies a function of fre- quency (altitude), by decreasing from 75◦ – 80◦ to 70◦ – 75◦ over 10 – 40 MHz with slightly larger values in the northern hemisphere, and independently varies as a function of time (or longitude of Io). Its uncertainty of a few degrees is dominated by the error on the longitude of the active IFT. The inferred values of Ee– also vary as a function of altitude and time. For the 11 investigated cases, they range from 3 to 16 keV, with a 6.6 ± 2.7 keV average.

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