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Case studies of SKR planetary rotations

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We analyze the Saturnian Kilometric Radiation (SKR) recorded by the Radio and Plasma Wave Science experiment (RPWS) onboard the Cassini spacecraft. This radio emission is generated by electron beams carried along by the planetary magnetic field. The regular monitoring of such radiation allowed to derive the planetary rotation rate in the case of Saturn, and the other magnetized planets, like Jupiter and Uranus. Precise investigations of the SKR radiation, recorded by Ulysses and Cassini spacecraft, have shown two different rotation periods in the northern hemisphere and in the southern one. The deviation is of about 13 minutes between both hemispheres. In this work we attempt to characterize the spectral features associated to each hemisphere. Observational parameters are used to describe those features like arc shapes and their orientations (i.e. vertex-early and -late arcs), the symmetric pattern, the time duration and the presence, or not, of a frequency drift rate. We show some cases where the planetary rotation can be 'spectrally' estimated for the northern or southern hemisphere. However a real difficulty appears when we try to follow and track the period, from one rotation to the next. We discuss the spectral complexity of the SKR rotation period particularly when it is compared to the Jovian radio emissions. The concept of the hollow cone is addressed in this context in particular its geometrical symmetry and its axis tangent to the local magnetic field crossing the source region.