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Variation of the Saturn Kilometric Radiation Polarization with the location of Cassini: statistical results and interpretation

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The Saturn Kilometric Radiation (SKR) detected from high latitudes orbits (between 30° and 60°) showed elliptical polarization. The data set used here investigates all the 2007 and 2008 high latitude orbits which go as high as 80° in latitude. We show that the SKR is elliptically polarized at moderately high latitudes ($> 30^\circ$), as already reported. Surprisingly, we also show that at very high latitude ($>\sim 70^\circ$), the SKR polarization is clearly circular again. We present a statistical study of the dependence of SKR polarization as a function of latitude, local time and distance of the observer. A possible dependence of the SKR polarization on the observer's local time is pointed out. A case study is detailed, in which we follow the variation of SKR polarization along an inclined orbit. Implications in terms of physical interpretation are debated.