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Physical properties of the Saturn's rings with the opposition effect.

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We use the Cassini/ISS images from the early prime mission to build lit phase curves data from 0.01 degrees to 155 degrees at a solar elevation of 23-20 degrees. All the main rings exhibit on their phase curves a prominent surge at small phase angles. We use various opposition effect models to explain the opposition surge of the rings, including the coherent backscattering, the shadow hiding and a combination of the two (Kawata & Irvine 1974 In: Exploration of the planetary system Book p441; Shkuratov et al. 1999, Icarus, 141, p132; Poulet et al. 2002 Icarus, 158, p224 ; Hapke et al. 2002 Icarus, 157, p523).
Our results show that either the coherent backscattering alone or a combination of the shadow hiding and the coherent backscattering can explain the observations providing physical properties (albedo, filling factor, grain size) consistent with previous other studies. However, they disagree with the most recent work of Degiorgio et al. 2011 (EPSC-DPS Abstract #732). We think that their attempt to use the shadow hiding alone lead to unrealistic values of the filling factor of the ring particles layer. For example they found 10^-3 in one of the thickest regions of the C ring (a plateau at R=88439km with an optical depth tau=0.22). We totally disagree with their conclusions stating that these values are consistent for the C ring plateaux and did not found any references that are consistent with theirs, as they claimed. We believe that their unrealistic values originated from the assumptions of the models they used (Kawata & Irvine and Hapke), which are basically an uniform size distribution. Any model using an uniform size distribution force the medium to be very diluted to reproduce the opposition surge. Our modeling that uses a power law size distribution provides realistic values. All these results have been already published previously (http://adsabs.harvard.edu/abs/2007PhDT.....25D) and are summarized in a forthcoming manuscript submitted to publication so we recommend to Degiorgio et al. to either cite our work properly or at least try to produce an original work.

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