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Detection of interstellar dust with STEREO/WAVES at 1AU

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Cosmic dust particles contain a significant fraction of the matter of the interplanetary medium. Most in-situ measurements of the dust have been carried out with dedicated dust instruments. Dust particules can also be detected with radio and plasma wave instruments. The high velocity impact of a dust particle generates a small crater on the spacecraft and the dust particle and the crater material are vaporized and partly ionized. This charge can be detected with plasma instruments designed to measure electric and magnetic fields. This was observed for the first time when the Voyager spacecraft crossed the dust rings of Saturn (Aubier et al. 1983, Gurnett et al. 1983). Since then several dust observations were based on measuring electric signals.

Since 2007 the STEREO/WAVES instrument (Bourgeret et al. 2007) carries out radio and plasma wave measurements near 1AU. The STEREO mission consists of two spacecraft that are orbiting the Sun at about 1 AU before and behind the Earth and move away from Earth by 22 degree per year. The spacecraft are 3 axis stabilized and on each spacecraft the STEREO/WAVES instrument consists of 3

antennas of 6 m length. Even though this mission was primarily designed to study the solar and inner heliospheric plasmas in three dimensions, it turned out to be a serendipitous dust detector over a wide range of grain sizes. The instruments recorded a large number of events due to dust impacts, since the detection surface is a few meters wich is larger than those used in dedicated dust experiments. Here we will concentrate on the discussion of those impacts that were recorded with all three antennas and show characteristics similar as previous dust measurements with wave instruments. We interprate them as being produced by dust grains originating from the local interstellar cloud and by β-meteorites. From the study of these fluxes during 4 years of STEREO mission and their modelisation, we determined the direction of arrival of interstellar dust and its temporal variation at 1AU between 2007 and 2010. We also give an estimate of the mass distribution of interstellar dust and β-meteorites in the detected range.