

RF EMISSION FROM HYPERVELOCITY IMPACT PLASMA

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We report the detection of radio frequency (RF) emission at 315 and 916 MHz associated with electromagnetic pulses (EMPs) from hypervelocity impacts of micro particles in ground-based experiments. These data were collected using the dust accelerator at the Max Planck Institute in 2011. Hypervelocity micro particles, including meteoroids and space debris with masses < 1 ng, routinely impact spacecraft and produce plasmas that are initially dense but rapidly expand into the surrounding vacuum. These plasmas produce EMPs that are influenced by plasma turbulence and depend strongly on impactor speed and the charging conditions of the spacecraft. In particular, we find that impacts of micro particles traveling > 14 km/s produce RF when they impact a charged spacecraft surface; particles traveling slower do not produce RF.