Title: Dust impact detection by Cassini's Langmuir Probe

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Abstract:

The Langmuir Probe (LP) instrument on the Cassini mission is sensitive to dust impacts and such events can be recognized as transient events in the measured traces. The LP instrument is part of the Radio and Plasma Wave Science (RPWS) subsystem on Cassini, employing a 50 mm diameter sphere as the collector element. Sharp spikes are observed in a subset of the collected current-voltage (I-V) traces that have been theorized to be due to dust impacts, followed by the subsequent collection of charge from the dust impact plasma. LP data from 2009 and 2010 are analyzed, when Cassini was within the E ring, and at various distances from the planet. A software tool is developed to identify the spikes in the LP traces, while discarding pickup events from spacecraft operations. The preliminary analysis indicates that the spatial distribution of detected impact events is similar to distribution of dust particles in the E ring, as observed by other instruments. This analysis suggests that the spikes in the LP data are indeed generated by dust impacts. Uncertainties remain, however, as at this point due to the incomplete understanding how the electronics of the LP instrument registers the transient charge collections events from dust impacts.