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Time of flight spectra of dust impacts in the solar system and at comets Wild 2 and Tempel 1 as measured by CIDA.

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Cometary and Interstellar Dust Analyzer, CIDA, has been operated in space from launch on Stardust in February 1999 until its second comet flyby on StardustNExT in February 2011, yet not cotinuously. During its mission, it has made observations of dust at comet Wild 2 in 2004 and at comet Tempel 1 in 2011, as well as during the cruise phases to the comets. The instrument operates as a transient recoder of signals from ions produced by impacts of dust grains onto its silver target. Data sets are stored whenever an ion signal reaches the trigger level.

The method has been used successfully earlier during missions to Halleys comet in 1986, where both, mineral and organic material was found. By nature the ion formation processes depend on the speed and the size of incident dust grain. While at Halley impact speeds were 70 km/s and higher. The CIDA observations have been made under a wide range of conditions from a minimum speed of 6.2 km/s at Wild 2 to 10.9 km/s at Tempel 1 and possibly much higher speeds of assumed $\sim$ 30 km/s in interplanetary space. Observations of both, positive and negative ions have been made.

To understand the measurementss, we have applied modern mathematical methods, which showed the existence of several groups of data with similar properties. Comparisons between each group of events and a large set of calibration data obtained at the Heidelberg Dust accelerator Laboratory have been made. Due to the complexity of the mechanisms for ion production from organic mixtures, it is difficult to identify individual chemicals. The use of advanced methods to determine the classes of chemistry from the observations shows encouraging first results.

Some120 spectra have been recorded at the comets and some 50 during the interplanetary cruising phases of the mission. The results show the presence of complex organic molecules. At the comets, in negative ion mode spectra we find CN ions. Only a few spectra point at the presence of minerals. This might be another hint that mineral grains are coated by organic materials. We present the observational data acquired and demonstrate the methods for their interpretation.