**HOW OLD ARE SATURN’S RINGS.** S. Kempf1, N. Altobelli2, J. Schmidt3,4, J. N. Cuzzi5, P. R. Estrada5, and R. Srama6, 1LASP, U. of Colorado, Boulder, CO 80303, USA (sascha.kempf@colorado.edu), 2ESA-ESAC, E-28691 Villanueva de la Canada, Madrid, Spain, 3Institut für Geologische Wissenschaften, Freie Universität Berlin, Germany, 4Space Physics and Astronomy Research Unit, University of Oulu, Oulu, Finland, 5Space Science Division, NASA Ames Research Center, Moffett Field, CA 94035, USA, 6Institut für Raumfahrtsysteme, Universität Stuttgart, Stuttgart, Germany

**Introduction:** One of the most exciting and controversial aspects of Saturn’s magnificent rings is that they may actually be a recent phenomenon in the solar system – forming long after the Earth, Saturn, and its moon. This possibility has been vigorously debated for nearly 40 years, since the Voyager flybys of Saturn. Over the years, the most powerful support for this hypothesis has turned out to be the puzzle of the rings’ nearly pure water ice composition – unique in the family of planetary rings – in spite of the constant hail of rocky-carbon meteoroids from outside the Saturn system. However, three major uncertainties have left the young-ring hypothesis unproven. Two of these have already been resolved by the Cassini mission: the amount of non-icy material currently in the rings, and the total ring mass. The third main constraint is the mass flux of non-icy meteoroids falling onto the rings.

Measuring this mass flux was always a main science goal of the Cassini mission, and could only be achieved by the Cassini Cosmic Dust Analyzer instrument (CDA). In this talk we will report about the determination of the mass flux of non-icy material coming into the Saturn system, which completes the trifecta of constraints that are required to strongly support a youthful ring system [1]. The measurements present a thorough and detailed analysis of the series of unconnected individual particle detections by CDA over Cassini’s entire 13 year mission, converting these detections into the desired mass flux. The CDA detections determine the incident particle orbits, and they come (surprisingly) not from comets as expected, but mostly from Kuiper Belt Objects. This means that most of the particles have low speeds relative to Saturn and are strongly focused gravitationally, such that the flux at the rings is even larger than previously estimated. The derived mass flux implies a ring exposure time of less than 100 to 400 million years, which is in support of recent ring formation scenarios.