Development of the DESTINY+ Dust Analyzer and future Dust Instruments by the Dust Group of the University of Stuttgart, Osaka, Japan on Tuesday, September 16, 2025 - Saturday, September 20, 2025

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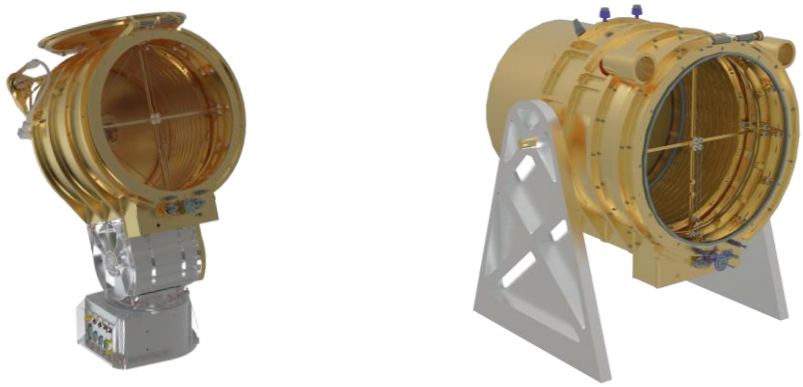
The DESTINY+ Dust Analyzer (DDA) serves as the main scientific instrument on the DESTINY+ mission, focusing on the in-situ analysis of cosmic dust. It examines interplanetary and interstellar dust within 1 AU of the Sun and explores the dust environment surrounding asteroid (3200) Phaethon. By integrating a trajectory sensor with a time-of-flight mass spectrometer, the DDA captures data on the size, velocity, charge, and composition of individual dust grains. Its two-axis pointing system improves sky coverage, establishing DDA as an essential tool for enhancing our knowledge of cosmic dust streams and their composition throughout the DESTINY+ trajectory.



Rendered Image of the DESTINY+ Dust Analyzer Flight Model (left) and possible follow up mission (right)

The development of the DESTINY+ Dust Analyzer is an engaging case study on how to develop a cutting-edge dust science instrument within the confines of a challenging timetable and involving teams spread out all over the globe. This talk aims to give an overview of the design process of the DESTINY+ Dust Analyzer, the challenges encountered along the way and how they were met as well as the most important lessons learned for future projects.

The talk gives a summary of the physical inner workings of the DESTINY+ Dust Analyzer, covering both the in-situ measurement of dust particles as well as the mechanical pointing mechanism which grants the instrument its versatility in what dust streams can be observed. Special focus will be placed on lessons learned during development so other teams working on similar projects know which pitfalls to carefully navigate or avoid. In addition, the DESTINY+ Dust Analyzer serves as an excellent base line for future instruments which can be incorporated into missions orbiting earth, other planets or cruising through interstellar space. With varying constraints placed on the design by the mission parameters, the capabilities of the system can be greatly expanded or refined. Examples of this potential are explored during the talk using specific examples of upcoming projects of the University of Stuttgart Dust Science Group led by Professor Dr. Ing Ralf Srama.