

## **Session Program**

**7-11 Nov 2022**



## **2nd International Stardust Conference**

**----- STARCON 2 -----**

## ***EXPLORATION OF ASTEROIDS SYMPOSIUM***

ESA ESTEC, Newton meeting room  
Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands

# Monday 7 November

09:15

## EXPLORATION OF ASTEROIDS SYMPOSIUM: Small satellite technologies for deep-space missions

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Angelo Cervone

09:15–09:30 **Opening**

**Speaker**

Bojan Novaković

09:30–10:15

### KEYNOTE - Design of components and small satellites for critical missions.

**Speaker**

Bert Monna

10:15–11:00

### ARGOTEC Technologies serving Exploration of Asteroids

**Speaker**

Valerio Di Tana

11:00

11:30

## EXPLORATION OF ASTEROIDS SYMPOSIUM: Small satellite technologies for deep-space missions

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Angelo Cervone

11:30–12:00

### CubeSats towards outer space: solutions and challenges for the propulsion subsystem

**Speaker**

Paola De Carlo

12:00–12:30

### Perspectives for Nitrous Oxide-based Green Bi-Propellants for Small Satellites Beyond LEO

**Speaker**

Bastiaan Bom

12:30–13:00

### Combined Crosslink Radiometric and Optical Navigation for Distributed Deep-Space Systems

**Speaker**

Stefano Casini

13:00

14:00

## EXPLORATION OF ASTEROIDS SYMPOSIUM: Autonomy and reliability of small satellites for deep-space exploration.

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Angelo Cervone

14:00–14:45

### KEYNOTE - RAMS and FDIR for Complex CubeSat Missions

**Speaker**  
Silvana Radu

14:45-15:15 **Applying Digital Risk Twin & Causation-Based AI for Space Assets**

**Speaker**  
Raphaël CHAGNOLEAU

15:15-15:45 **Detecting and Predicting Anomalies in Satellite Systems**

**Speaker**  
Lars Herrmann

15:45

16:15

**EXPLORATION OF ASTEROIDS SYMPOSIUM: Autonomy and reliability of small satellites for deep-space exploration**

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Angelo Cervone

16:15-16:45

**Increasing RAMS for Novel Low Cost and Complex Missions Based on CubeSat Technologies**

**Speaker**  
Beatriz Delmas Garcia

16:45-17:15

**The Path Towards Improving Autonomy and Reliability of Complex CubeSat Missions**

**Speaker**  
Angelo Cervone

17:15-17:45

**Design and Simulation of High-Accuracy Star-Trackers Algorithms for Autonomous Line-of-Sight Navigation**

**Speaker**  
Stefano Casini

17:45

# Tuesday 8 November

09:15

## EXPLORATION OF ASTEROIDS SYMPOSIUM: Orbiting about small bodies

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Francesco Topputo

09:15–09:30 **Opening**

**Speaker**  
Francesco Topputo

09:30–10:00 **KEYNOTE - Orbital Dynamics around Asteroids**

**Speaker**  
Xiyun Hou

10:00–10:15

**Asteroid Rendezvous Trajectory Optimization with Stochastic Convex Optimization Approach**

**Speaker**  
Tomohiro Ishizuka

10:15–10:30

**Dynamical modeling and characteristic analysis of orbits around a comet**

**Speaker**  
Yuchen He

10:30–10:45

**Monte Carlo Tree Search for Autonomous Small Body Science Operations**

**Speaker**  
Adam Herrmann

10:45–11:00

**Near-Optimal Finite-Thrust Orbital Control Near A Binary Asteroid System**

**Speaker**  
Zicen Xiong

11:00

11:30

## EXPLORATION OF ASTEROIDS SYMPOSIUM: Navigating about small bodies

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Francesco Topputo

11:30–12:00 **KEYNOTE - Unveiling Didymos mysteries: the Hera mission**

**Speaker**  
Ian Carnelli

12:00–12:15

**Semi-autonomous navigation and gravity estimation around small bodies**

**Speaker**  
Julio C. Sanchez

12:15-12:30

**Bennunet - Applying Deep Learning for Optical Relative Navigation of an Asteroid**

**Speaker**

Alfredo Escalante López

12:30-12:45

**Enhanced Vision-Based Algorithms about Small-Bodies: Lessons learned from the Stardust-R experience**

**Speaker**

Mattia Pugliatti

12:45-13:00

**Kinetic Impact Planetary Defense Demonstration Mission Concept via Resonant Orbit Transfers.**

**Speaker**

Mingtao Li

13:05

14:00

**EXPLORATION OF ASTEROIDS SYMPOSIUM: Missions for minor bodies exploration**

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Conveners:** Pablo Hermosín, Simone Centuori

14:00-14:45

**KEYNOTE - Fast Kinetic Impactor**

**Speaker**

Jesus Gil

14:45-15:30

**KEYNOTE - Comet Interceptor Mission. Deepening the Probe B2 design**

**Speaker**

Beatriz Delmas Garcia

15:30-15:50

**The Design Pipeline of the Milani Mission: Overview and Challenges After DART Impact**

**Speaker**

Mattia Pugliatti

15:50

16:15

**EXPLORATION OF ASTEROIDS SYMPOSIUM: Missions for minor bodies exploration**

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Conveners:** Pablo Hermosín, Simone Centuori

16:15-16:35

**Application of Efficient Uncertainty Propagation Methods in the Design and Analysis of Asteroid Missions**

**Speaker**

Isto Fodde

16:35-16:55

**A mission concept for in-orbit particle collection around asteroids**

**Speaker**

Mirko Trisolini

16:55-17:15

**Autonomous navigation around Didymos using CNN-based Image Processing.**

**Speaker**

Mewantha Aurelio Kaluthantrige Don

17:15-17:35

**Efficient design of optimal low-energy trajectories to Near Earth Objects**

**Speaker**

Elena Fantino

17:35-17:55

**Physics-Informed Neural Network Gravity Models for Small-Body Exploration**

**Speaker**

John Martin

17:55

## Wednesday 9 November

09:15

### EXPLORATION OF ASTEROIDS SYMPOSIUM: Computation of asteroid orbits

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Conveners:** Giulio Baù, Giovanni Gronchi

09:15–09:35 **Opening**

**Speakers**

Giovanni Gronchi, Giulio Baù

09:35–10:20

#### KEYNOTE - Solving the mystery of disappearing asteroids with telescopic observations, numerical modeling, space missions, and lab experiments

**Speaker**

Mikael Granvik

10:20–10:40 **Orbit Determination in Large Datasets**

**Speaker**

Óscar Rodríguez

10:40–11:00

#### Initial orbit determination from one position vector and a very short arc of optical observations

**Speaker**

Erica Scantamburlo

11:00

11:30

### EXPLORATION OF ASTEROIDS SYMPOSIUM: Computation of asteroid orbits

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Conveners:** Giovanni Gronchi, Giulio Baù

11:30–11:50

#### Deepening asteroid dynamics in the new era of observations: the project MONASTER (MONitoring ASTERoids)

**Speaker**

Giacomo Tommei

11:50–12:10

#### How to estimate the pre-entry mass of meteoroids at the source of large fireballs

**Speaker**

Simon Anghel

12:10–12:55

#### KEYNOTE - Orbit determination at Minor Planet Center, an overview: Recent improvements and future developments

**Speaker**

Federica Spoto

13:00

14:00

**EXPLORATION OF ASTEROIDS SYMPOSIUM: Poster Session**

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Bojan Novaković

14:00-14:05 **Introduction**

14:05-14:10 **Legal Implications of Asteroid Mining**

**Speaker**  
Aaron Groh

14:10-14:15

**The equation between 3-body mean motion resonances and Yarkovsky drift speeds on eccentricities higher than 0.1**

**Speaker**  
Ivana Milic Zitnik

14:15-14:20 **(130) Elektra - dynamical analyses on the region of the third moonlet.**

**Speaker**  
Giulia Valvano

14:20-14:25 **Dinamycal particles around the asteroid 99942 Apophis.**

**Speaker**  
Raí Machado Oliveira

14:25-14:30

**The Asteroid Criticality Index: a tool for the future exploration of Solar System small bodies**

**Speaker**  
Marco Fenucci

15:30



## Thursday 10 November

09:15

### EXPLORATION OF ASTEROIDS SYMPOSIUM: Near-Earth Objects - Observations

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Bojan Novaković

09:15–09:35 **Opening**

09:35–10:20 **KEYNOTE - Observations of Near-Earth objects**

**Speaker**

Julia de Leon

10:20–10:40 **A Novel Observation Strategy for Asteroids Shape Reconstruction**

**Speaker**

Edoardo Ciccarelli

10:40–11:00 **Study of the active asteroid (6478) Gault**

**Speaker**

Albino Carbognani

11:00

11:30

### EXPLORATION OF ASTEROIDS SYMPOSIUM: Near-Earth Objects - Observations

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Bojan Novaković

11:30–12:00

#### Activities of the NEO Coordination Centre of ESA's Planetary Defence Office

**Speaker**

Juan L. Cano

12:00–12:20 **Earth's temporary satellites - population, observations and prospects**

**Speaker**

Grigori Fedorets

12:20–12:40 **A Monte Carlo evolution model of small main belt asteroids**

**Speaker**

Marco Fenucci

12:40–13:00

#### Analysis of co-orbital motion of real asteroid in a medium-term timescale

**Speaker**

Sara Di Ruzza

13:00

14:00

## EXPLORATION OF ASTEROIDS SYMPOSIUM: Near-Earth Objects - Models and simulations

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Conveners:** Bojan Novaković, Marco Fenucci

14:00-14:45

### KEYNOTE - Revealing Asteroid (162173) Ryugu's Thermophysical Properties with Data Assimilation

**Speaker**

Maximilian Hamm

14:45-15:05

### Planetary Society Step Grant project: Demystifying Near-Earth Asteroids

**Speaker**

Bojan Novaković

15:05-15:25

### Storage and release of volatiles in small bodies

**Speaker**

Dennis Bodewits

15:25-15:45

### The past orbital and thermal evolution of asteroid (162173) Ryugu

**Speaker**

Millena Castro Guimarães

15:45

16:15

## EXPLORATION OF ASTEROIDS SYMPOSIUM: Near-Earth Objects - Models and simulations

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Conveners:** Marco Fenucci, Bojan Novaković

16:15-16:35

### NASA JPL's Planetary Defense Activities

**Speaker**

Lorraine Fesq

16:35-16:55

### On the Possibility that 2016 HO3 Kamo'oalewa was a Piece of the Moon

**Speaker**

Ricardo Moraes

16:55-17:15

### Dynamical evolution of small family members: 288P cluster case study

**Speaker**

Mara Čutura

17:15-17:35

### Dawn's probability of capture into 1:1 ground-track resonance around Vesta

**Speaker**

Wail Boumchita

17:35-17:55

### A dynamical study of an earth-grazing fireball

**Speaker**

Marcelo De Cicco

17:55

## Friday 11 November

09:15

### EXPLORATION OF ASTEROIDS SYMPOSIUM: Asteroid deflection

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Giovanni Gronchi

09:30–09:35 **Opening**

**Speaker**

Giovanni F. Gronchi

09:35–10:20

#### **KEYNOTE - The Hera mission role in the Asteroid Impact & Deflection Assessment (AIDA) collaboration**

**Speaker**

Paolo Tortora

10:20–10:40

#### **A dynamical definition of the sphere of influence of the Earth**

**Speaker**

Irene Cavallari

10:40–11:00

#### **Hera proximity operations - trajectories and autonomous navigation around binary asteroid Didymos**

**Speaker**

Jesus Gil

11:00

11:20

### EXPLORATION OF ASTEROIDS SYMPOSIUM: Asteroid deflection

**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands | **Convener:** Giovanni Gronchi

11:20–11:40

#### **NAROO Program - Precovery observations of Potentially Hazardous Asteroids Naroo**

**Speaker**

Anne-Charlotte Perlberg

11:40–12:00

#### **Deflection of potentially dangerous asteroids using the deflection technique by kinetic impact and gravitational perturbations**

**Speaker**

Bruno Chagas

12:00–12:20

#### **Intelligent Decision Support System for NEO Impact Scenarios Identification and Deflection Strategies Selection under Uncertainty**

**Speaker**

Yirui Wang

12:20–12:40

#### **A Review of a Multi-Spacecraft Strategy for the Capture of Near-Earth Asteroids**

12:50  
14:00  
15:40

**Speaker**  
Livia Ionescu

**EXPLORATION OF ASTEROIDS SYMPOSIUM: Asteroid deflection**  
**Session** | **Location:** ESA ESTEC, Newton meeting room, Noordwijk, ESA Estec, 2201 AZ Noordwijk, Netherlands |  
**Convener:** Giovanni Gronchi

14:00-14:20  
**A LiDAR-less Approach to Autonomous Hazard Detection and Avoidance Systems based on Semantic Segmentation**  
**Speaker**  
PELAYO PEÑARROYA RODRIGUEZ

14:20-14:40 **Dynamics modelling of satellites orbiting oblate bodies**  
**Speaker**  
Gabriela-Ana Nadabaica

14:40-15:00  
**NEO AND SPACE DEBRIS EUROPEAN INITIATIVES: PAST AND FUTURE LESSONS LEARNED**  
**Speaker**  
Ettore Perozzi