



**MIAPP** Munich Institute for  
Astro- and Particle Physics

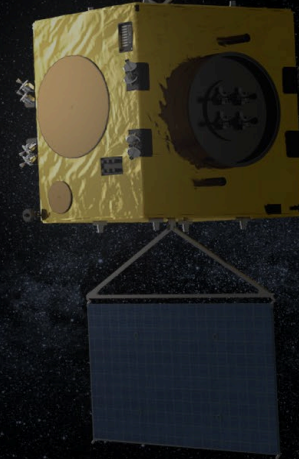


Image credits: ESA Space in Images – 2015 – Hera in orbit

# MIAPP workshop 2018 report

Camilla Colombo, Detlef Koschny  
*Space Mission Planning Advisory group*

# MIAPP workshop

## Near-Earth Objects: properties, detection, resources, impacts and defending Earth

- MIAPP = Munich Institute for Astro- and Plasma Physics
- Funded by academical institutes in Bavaria/Germany
- 4 weeks workshop: typically between 30 to 40 experts per week

Scientific Programmes 2018

Topical Workshops 2018

NEAR-EARTH OBJECTS: PROPERTIES, DETECTION, RESOURCES, IMPACTS AND DEFENDING EARTH

14 May - 8 June 2018

Andreas Burkert, Camilla Colombo, Robert Jedicke, Detlef Koschny, Richard Wainscoat

This programme will bring together an international group of experts in the fields of asteroid properties, detection, in-situ resource utilisation, orbit analysis, impact hazard assessment, and planetary defence, in combination with specialists from ESA and NASA and risk management organisations, to (i) identify how to dramatically reduce the current uncertainties in the number, orbital distribution and physical properties of asteroids that limit the determination of the Earth impact risk, (ii) clarify what is needed to generate a complete inventory of all asteroids that could impact Earth within the next century, (iii) estimate the availability of resources extracted from NEOs as a function of the delta-v required to return the material to near-Earth space and identify the most promising candidates, (iv) assess current limitations to impact risk assessment, and (v) evaluate and optimise strategies to deflect asteroids that could impact Earth. The conclusions of this programme will be summarised in a white paper with recommendations for future work and coordination for NASA, ESA, and other space agencies, the UN-sanctioned International Asteroid Warning Network and the Space Mission Planning Advisory Group (IAWN and SMPAG), and other interested organisations.

**Web:** <http://www.munich-iapp.de/programmes-topical-workshops/2018/near-earth-objects-properties-detection-resources-impacts-and-defending-earth/>

# MIAPP workshop

## Discussions

- Interdisciplinary discussion with experts from different fields
  - Observation
  - Orbit determination
  - Dynamics
  - Asteroid missions
  - Asteroid deflection
  - Asteroid exploitation
  - Legal
  - Communication of risk
  - Impact monitoring
  - Scientific studies
  - Payload development
- Session organisation
  - Technical introduction
  - Research and discussion questions
  - Presentation of works and ideas (favour discussion not conference-like presentations)
  - Find promising ideas, needs, developments
  - Record them

## Discussion topics

2018 MIAPP Discussion Notes

2018 MIAPP NEOS Workshop Photos and Videos

2018-05-14 Discussion #1 - Introduction & 5 minute collaborations

2018-05-14 Discussion #2 - Dynamical Structure of the Main Belt and NEO Provenance

2018-05-15 Discussion #1 - Science at Asteroids

2018-05-15 Discussion #2 - Space Law with Paul Stimers

2018-05-16 Discussion #1 - Asteroid Mining

2018-05-16 Discussion #2 - International coordination

2018-05-17 Discussion #1 - Asteroid deflection

2018-05-17 Discussion #2 - Science communication

2018-05-18 Wendelstein Observatory Visit Photos & Videos

2018-05-21 Discussion #1 - Introduction & 5 minute collaborations

2018-05-21 Discussion #2 - Surveys

2018-05-22 Discussion #1 - Asteroid Missions

2018-05-22 Discussion #2 - Impacts & Atmospheric Effects

2018-05-23 Discussion #1 - Interstellar Objects as NEOs

2018-05-23 Discussion #2 - Consequences and coordination of Impact response

2018-05-24 Discussion #1 - Asteroid Astrometric & Physical Followup\_

2018-05-24 Discussion #2 - Dynamics and Impact Monitoring

2018-05-25 Discussion #1 - Physical properties of asteroids

2018-05-25 Discussion #2 - White paper group editing

2018-05-28 Discussion #1 - Introduction & 5 minute collaborations

2018-05-28 Discussion #2 - Dynamical Structure of Asteroid Belt and NEO Provenance

2018-05-29 Discussion #1 - Science at Asteroids

2018-05-29 Discussion #2 - Space Law w\_ Paul Stimers

2018-05-30 Discussion #1 - Asteroid Mining

2018-05-30 Discussion #2 - International coordination

2018-05-31 Discussion #1a - neo-NEO-Business Models

2018-05-31 Discussion #1b - Asteroid Deflection

2018-05-31 Discussion #2 - Science Communication Panel

2018-06-04 Discussion #1 - Introduction & 5 minute collaborations

2018-06-04 Discussion #2 - Impact and Atmospheric Effects

2018-06-05 Discussion #1 - Spacecraft Missions

2018-06-05 Discussion #2 - Physical Properties of Asteroids

2018-06-06 - Discussion #1 - Interstellar Objects as NEOs

2018-06-06 - Discussion #2 - Consequences and coordination of impact response

2018-06-07 - Discussion #1 - Surveys

2018-06-07 - Discussion #2 - Dynamics and Impact Monitoring

2018-06-08 - Discussion #1 - Asteroid astrometric and physical followup

2018-06-08 - Discussion #2 - White paper group editing

# MIAPP workshop

## Discussion topics

- 5-min collaboration session
- Dynamical structure of asteroid belt and NEOs
- International coordination
- Science at asteroids
- Asteroid mining
- Science communications
- Asteroid deflection
- Spacecraft missions
- Surveys
- Consequences and coordination of impact response
- Interstellar objects as NEOs
- Follow-up
- Dynamics and impact monitoring

# MIAPP workshop

## White paper

- Asteroid and comet surveys
  - Surveys
  - Asteroid Follow-up
  - Interstellar Objects as NEOs
- Science
  - Physical Properties of Asteroids and Comets
  - Science at Asteroids
- Dynamics
  - Dynamical Structure of the Asteroid Belt and NEO Provenance
  - Dynamics of asteroids and Impact Monitoring
  - Orbit at Asteroids and Comets
- Asteroid impacts
  - Impact and Atmospheric Effects
- International Coordination
  - Consequences and Coordination of Impact Response
  - International Cooperation
- Public Communication
  - Science Communication
- Planetary defence
  - Asteroid Deflection
- Asteroid Mining
  - Asteroid Mining
  - Space Law
- Missions
  - Spacecraft Missions



**White paper**



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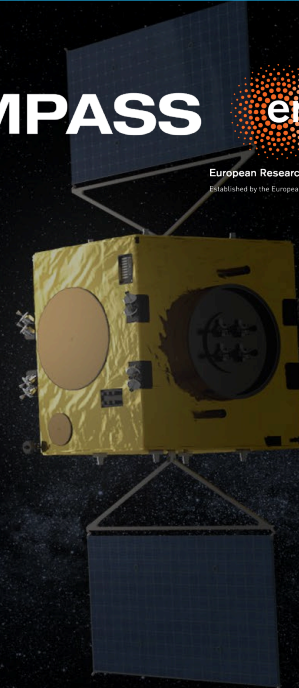


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