PDC2019
Washington, DC, USA

Please send your abstract to iaapdc (at) iaamail.org

You may visit www.pdc.iaaweb.org

(please choose one box to be checked)
(you may also add a general comment - see end of the page)

☐ **Key International and Political Developments**
☐ **Advancements and Progress in NEO Discovery**
☐ **NEO Characterization Results**
☐ **Deflection and Disruption Models & Testing**
☒ **Mission & Campaign Designs**
☐ **Impact Consequences**
☐ **Disaster Response**
☐ **Decision to Act**
☐ **Public Education & Communication**

Hera planned mission and payload operations at close proximity of the Didymos binary asteroid system after DART impact

Özgür Karatekin[1], Stephan Ulamec [2], Naomi Murdoch[3], Cecilia Tubiana[4], Carsten Güttler[4], Patrick Michel[5], Michael Küppers[6], Ian Carnelli[6],

Alain Herique[7], Albert Falke[8], Patrick Bambach[4], Björn Grieger[6], Cesar Bernal Feanco[9], Daniel Hestroffer[10], Jakob Deller[4], Yoshifumi Futaana[11], Graciela Gonzalez[12], Jean-Baptiste Vincent[13], Jens Biele[2], Jesus Gil Fernandez[6], Jan-Erik Wahlund[11], Akos Kereszturi[14], Kieran Carroll[15], Michelle Lavagna[16], Paolo Tortora[17], Paulo Gordo[18], Holger Sierks[4], Simon Green[19], Tom Andert[12], Tomas Kohout[20], Valerie Ciarletti [21], Frederich Damme [22], Hannah Goldberg [23], Jean-Luc Josset[24], Michelle Lavagna[25], Jürgen Oberst[13], Stephen Schwartz[5]

[1]*Royal Observatory of Belgium,* [2]*German Aerospace Center DLR Cologne,*[3]Institut Supérieur de l'Aéronautique et de l'Espace [4] Max-Planck-Institut für Sonnensystemforschung, [5] *UNS-CNRS-Observatoire de la Cote d'Azur* [6] *European Space Agency* [7] *Univ. Grenoble-Alpes* [8]*Airbus,* [9] *ISIS Space ,* [10]*IMCCE, Paris observatory, univ. PSL,* [11] *Swedish Institute of Space Physics,* [12] *Universität der Bundeswehr München,* [13] *German Aerospace Center DLR, Berlin,* [14] *Research Center for Astronomy and Earth Sciences, Konkoly Thege Miklos Astronomical Institute,* [15]*Gedex ,* [16] *Politecnico di Milano ,* [17]*Università di Bologna,* [18]*Universidade de Lisboa* [19]*Open University,* [20]*University of Helsinki,* [21] *Le Laboratoire Atmosphères, Milieux, Observations Spatiales (LATMOS),* [22] TU Berlin, [23]GOMSPACE, [24] Space-X, [25] Politecnico di Milano

Keywords: *Binary asteroid, asteroid characterization, navigation, proximity operations.*

ABSTRACT

HERA is a candidate ESA mission that will be launched to the Didymos binary asteroid system in 2023. It will perform a detailed post-impact survey of the smaller of the two bodies, Didymoon, following the kinetic impact by the NASA's Double Asteroid Redirection Test (DART) spacecraft planned in 2022. DART and HERA were conceived together as parts of the international 'Asteroid Impact Deflection Assessment' (AIDA) mission.

HERA aims to characterize the physical and dynamical properties of Didymoon including its mass and shape as well as the properties of the impact crater and surface morphology in general. It will carry optical navigation cameras – the Asteroid Framing Cameras (AFCs) –, a LIDAR, and a hyperspectral imager that will be used for proximity operations as part of the autonomous vision-based GNC system as well as for scientific purposes. The trajectories for the proximity operations are defined considering operational restrictions, spacecraft safety and, possibly, scientific objectives. Asteroid close-proximity operations will also provide optimal environment to test GNC solutions applicable to active debris removal and in-orbit servicing.

While in the vicinity of Didymoon, HERA will deploy Europe's first deep-space CubeSats, in order to gather additional data on Didymoon and its surroundings while testing new inter-satellite link technology for future mission architectures. These CubeSats will be placed in the proximity of Didymoon and can take greater risks than their mothership, thus delivering additional, complementary observations.

In this presentation, current HERA mission and proximity operations strategy will be discussed, with special focus on planned payload operations with the AFCs.