

IAF Symposium on Planetary Defense and Near-Earth Objects

Held at the 75th International Astronautical Congress
(IAC 2024)

Milan, Italy
14-18 October 2024

ISBN: 979-8-3313-1238-1

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2024) by International Astronautical Federation
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact International Astronautical Federation
at the address below.

International Astronautical Federation
100 Avenue de Suffren
75015 Paris
France

Phone: +33 1 45 67 42 60
Fax: +33 1 42 73 21 20

www.iafastro.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

PLANETARY DEFENSE FROM ASTEROIDS AND COMETS

KEYNOTE: A Mission to Demonstrate Rapid-Response Flyby Reconnaissance for Planetary Defense.....	1
<i>Nancy Chabot, Justin Atchison, Rylie Bull, Andrew Rivkin, Terik Daly, Ronald Ballouz, Andy Cheng, Olivier Barnouin, Carolyn Ernst, Angela Stickle, Jodi Berdis, Dawn Graninger, Sarah Hefter</i>	
Hypervelocity Impact Studies on Rubble Pile Asteroids	10
<i>Minh Lê, Justin Moreno, K. T. Ramesh</i>	
Near-Earth Objects Deflection Strategies: A Multicriteria Comparison for the Target Asteroid 2023 PDC	13
<i>Samuele Alberti, Camilla Colombo</i>	
Statistical Estimation of Thermal Inertia Based on the Yarkovsky Drift Detection for a Candidate Deflection Asteroid 2015 XF261.....	21
<i>Shoucun Hu, Haibin Zhao, Xiucai Wang</i>	
The Dynamical Environment of Potentially Hazardous Binary Asteroid (285263) 1998 QE2.....	30
<i>Flaviane Venditti, Marcelo Lisboa Mota</i>	
Flyeye 2.0 Telescope	37
<i>Francesco Maria Cerutti, Piero Gregori, Roberta Pellegrini, Luca Orioli, Francesco Zanetti, Francesco Diprima, Ernesto Doelling</i>	
Selection Biases for Discovering Aspherical Impactors with LSST.....	46
<i>W. Garrett Levine, Robert Jedicke</i>	
The Hera Milani Mission.....	54
<i>Margherita Cardi, Marco Pavoni, Daniele Calvi, Andrea Zanotti, Franco Perez Lissi, Paolo Martino, Ian Carnelli</i>	
ATENA: A Smallsat Mission for the 2029 Apophis Rendezvous.....	64
<i>Carlo Burattini, Giorgio Saita, Valerio Di Tana, Paride Amabili, Francesco Latella, Miguel Pereira, Eleonora Ammannito, Angelo Zinzi, Joseph A. Nuth, Bruno Sarli, Joshua Lyzloft, Terry A. Hurford</i>	
Summary and Highlights of the 2023 IAA Planetary Defense Conference.....	73
<i>Alex Karl, William Ailor, Brent Barbee, Gerhard Drolshagen, Romana Kofler, Nahum Melamed</i>	

INFORMING PLANETARY DEFENSE

KEYNOTE: Key Takeaways from the 5th Planetary Defense Interagency Tabletop Exercise	79
<i>Ronald Daly, Nancy Chabot, Julee Rendon, Anne Roberts-Smith, Dipak Srinivasan, Lisa Turner, Ruth Vogel, Scott Weinberg, Justin Atchison, Rylie Bull, Brent Barbee, Paul Chodas, Lorien Wheeler, Kelly Fast, Lindley Johnson, Leviticus "l. A." Lewis</i>	

Bridging the Gap in Science Communication Between the Planetary Defense Community and the Media.....	87
<i>Anastasia Medvedeva, Alex Karl</i>	
NEO Missions of JAXA	95
<i>Makoto Yoshikawa, Yuya Mimasu, Tatsuaki Okada, Takanao Saiki, Satoru Nakazawa, Yuichi Tsuda</i>	
Zodiac Pioneer: An Interplanetary Small Satellite Platform for Asteroid Reconnaissance	100
<i>Margherita Cardi, Filippo Corradino, Francesca Ingiosi, Isabella Pappagallo, Alessandro Morselli, Alessandra Mannocchi, Carmine Giordano, Iosto Fodde, Fabio Ferrari, Francesco Toppotto, Francisco Cabral, André Oliveira, Paolo Martino</i>	
Tagging 99942 Apophis and Future Near Earth Asteroids to Enhance Science Gain and Increase Information for Planetary Defense	109
<i>Shawn Gallagher, Joe Cassady, Brent Freeze, Adam Gill, Mayra Montrose</i>	
Uncertainty Analysis of Distributed Deflection of Potentially Hazardous Asteroids Using Multiple Impactors.....	113
<i>Minghu Tan</i>	
Analyzing Collision Probability for Asteroids Detected on Too Short Arcs.....	122
<i>Xin Liu, Roberto Armellin, Xiyun Hou, Laura Pirovano</i>	
 <u>INTERACTIVE PRESENTATIONS - IAF SYMPOSIUM ON PLANETARY DEFENSE AND NEAR-EARTH OBJECTS</u>	
Applying Systematic Review as a Tool for the Analysis and Classification of Papers Published in Journals and Conferences Related to Planetary Defense	134
<i>Ana Lucia Pegetti, Mischel Carmen Belderrain</i>	
Defining Eligible Initiatives for a Planetary Defense Strategy in Brazil by Applying the Strategic Choice Approach (SCA) of Soft Operational Research.....	138
<i>Ana Lucia Pegetti, Mischel Carmen Belderrain, Glayse Da Silva Ferreira</i>	
Study of Size Scale Effect in the Asteroid Deflection Due to Hypervelocity Impact.....	141
<i>Taishi Satou, Yasuhiro Akahoshi, Takao Koura, Koudai Tanaka</i>	
Analysis of Planetary Defense Techniques and the Role of Space Technology in the Future Exercises	151
<i>Rania Toukebri</i>	
Cooperative Guidance for Multiple Impactors Against Multiple Asteroid Debris	158
<i>Chang Lv, Zixuan Liang, Shengying Zhu</i>	
Evaluating the Legality of Nuclear Explosive Devices (NEDs) for Planetary Defense	163
<i>Dafni Politikou, Eleni Koumbarou, Vera I. Palialexi, Konstantinos Vavliakis</i>	
Analyzing the Influence of Asteroids Geometry and Velocity Angle to the Gains of Off-Center Impact Strategy in Asteroid Kinetic Deflection Missions	172
<i>Lee Kin Thong, Zhaokui Wang</i>	
Image-Based Multi-target Tracking for Asteroid and Debris After a Kinetic Impact.....	186
<i>Fangyuan Shi, Zixuan Liang, Dantong Ge</i>	

Near-Earth Asteroid Capture Mission Design Method Based on the Orbital Dynamics in the Planar-Circular Restricted Three-body Problem.....	191
<i>Kohei Yamaguchi, Xinbo Gu, Takaya Inamori, Ji Hyun Park</i>	
Re-Impact Guidance for Asteroid Defense Considering Multi-debris Avoidance	198
<i>Zhehao Xing, Zixuan Liang, Hao Zeng</i>	
SmallSat-Based Near-Earth Object (NEO) Detection Using Transformer AI Model for Improved Planetary Defense.....	203
<i>Nishita Sanghvi, Ekaterina Gikalo</i>	
Where Are We Now After DART?: An Analysis of Current Status of Planetary Defense Technologies and Policies?.....	216
<i>Erin Austen, Max King, Marcos Eduardo Rojas Ramirez, Megha Choudhary</i>	
Assessing International Cooperation for Planetary Defense: A Comparative Analysis of Space Policy Frameworks.....	231
<i>Alyse Beauchemin, Fotios Kotzakioulafis, Adrian Solorzano, Ningthoujam Dipak Singh, Farah Diya Yasmine, Sandra Unnikannan Thayyil, Lourdes Priyadarshini S, Virginia Maraglino, Saad Zainou, Carmen Romero, Chilla Sumana, Anupam Kumar, Alexander Hope Ferdinand Ferguson, Duke Larbie, Lorenzo Voltini, Mithil Joshi, Ruvimbo Doreen Supiya, Poorvi Shukla, Vangela Vanderpuye, Monica Siles, Jyothi Narayana Reddy</i>	
Future Planetary Defense from the Moon	244
<i>Claudio Maccone, Nancy C. Wolfson</i>	

Author Index