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☒ **Planetary Defense – Recent Progress & Plans**
☐ **NEO Discovery**
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[SESSION 1]

NEOSHIELD: PROGRESS TOWARDS AN INTERNATIONAL NEAR-EARTH OBJECT MITIGATION PROGRAM

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ABSTRACT

NEOShield is a European-Union funded project coordinated by the German Aerospace Center, DLR, to address near-Earth object (NEO) impact hazard mitigation issues. The NEOShield consortium consists of 13 research institutes, universities, and industrial partners from 6 countries and includes leading US and Russian space organizations. The project is funded for a period of 3.5 years from January 2012 with a total of 5.8 million euros. The primary aim of the project is to investigate in detail promising mitigation techniques, such as the kinetic impactor, blast deflection, and the gravity tractor, and devise feasible demonstration missions. Options for an international strategy for implementation when an actual impact threat arises will also be investigated.

The NEOShield work plan consists of scientific investigations into the nature of the impact hazard and the physical properties of NEOs, and technical and engineering studies of practical means of deflecting NEOs. There exist many ideas for asteroid deflection techniques, many of which would require considerable scientific and technological development. The emphasis of NEOShield is on techniques that are feasible with current technology, requiring a minimum of research and development

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work. NEOShield aims to provide detailed designs of feasible mitigation demonstration missions, targeting NEOs of the kind most likely to trigger the first space-based mitigation action.

Most of the asteroid deflection techniques proposed to date require physical contact with the threatening object, an example being the kinetic impactor. NEOShield includes research into the mitigation-relevant physical properties of NEOs on the basis of remotely-sensed astronomical data and the results of rendezvous missions, the observational techniques required to efficiently gather mitigation-relevant data on the dynamical state and physical properties of a threatening NEO, and laboratory investigations using gas guns to fire projectiles into asteroid regolith analog materials. The gas-gun investigations enable state-of-the-art numerical models to be verified at small scales. Computer simulations at realistic NEO scales are used to investigate how NEOs with a range of properties would respond to a pulse of energy applied in a deflection attempt.

The technical work includes the development of crucial technologies, such as the autonomous guidance of a kinetic impactor to a precise point on the surface of the target, and the detailed design of realistic missions for the purpose of demonstrating the applicability and feasibility of one or more of the techniques investigated. Theoretical work on the blast deflection method of mitigation is designed to probe the circumstances in which this last line of defense may be the only viable option and the issues relating to its deployment.

A global response campaign roadmap will be developed based on realistic scenarios presented, for example, by the discovery of an object such as 99942 Apophis or 2011 AG5 on a threatening orbit. The work will include considerations of the timeline of orbit knowledge and impact probability development, reconnaissance observations and fly-by or rendezvous missions, the political decision to mount a mitigation attempt, and the design, development, and launch of the mitigation mission. Collaboration with colleagues outside the NEOShield Consortium involved in complementary activities (e.g. under the auspices of the UN, NASA, or ESA) is being sought in order to establish a broad international strategy.

We present a brief overview of the history and planned scope of the project, and progress made to date.

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