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MOON-BASED PLANETARY DEFENSE OPERATIONS

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ABSTRACT

The Moon is the ideal location to launch intercepting missions to 2017 PDC. In the absence of aerodynamic heating, a ground-based linear motor system on the Moon can launch a series of heavy kinetic impactors to 2017 PDC, more economically and efficiently than launching them from the Earth.

Kinetic impactors launched from the Earth could overcome gravity by accelerating to the Earth's escape velocity, but avoid atmospheric drag and aerodynamic heating by flying out of the atmosphere before they gain the majority of the target velocity. On the Moon, since there is no atmosphere, all acceleration can be done at the surface of the Moon.

The Moon can provide the material to make the kinetic impactors' hull, as well as for the maneuvering engines and fuel. Water can be found on the Moon and used to fuel spacecraft engines. However, an alternative engine could use solid iron as its propellant. This new engine electromagnetically accelerates solid iron, similar to the way the ion engine electromagnetically accelerates ionized fuel to gain propulsion. Small-scale prototype has been developed and is available for presentation.

In addition, the Moon's rich Helium-3 deposits enables more nuclear options. Nuclear warheads can be brought from the Earth, but can be made on the Moon as well. Impact between a massive spacecraft and 2017 PDC would result in extreme temperature and pressure required to trigger thermonuclear fusion of Helium-3, or with a little assistance with uranium 235.

The construction of the linear accelerator on the Moon could be accomplished by robots. Power for the robots can be easily generated by solar panels. The current two obstacles of the robotic Lunar development are power logistics and the Moon sand. Because batteries die after finite recharge cycles, they cannot be used as the main power source. The Moon sand is very sharp and sticky, and it can get into the robots' moving parts: tires, tracks, or legs. Also, the robots may get stuck in deep sand.

The solution to these issues would be the use of the electrical rail transport. Robots are kept on the power grid, and also kept above the Moon sand, by rails laid over sleepers. Iron, aluminum, and silicon can be harvested from the surface of the Moon, then smelted and extruded to make beams, pipes, rails, sheet metal, or solar panels. 3D printers would be useful to form small but complicated shapes of components needed for this project. Robots can weld, which is the key to building structures or machineries on the Moon. This infrastructure also can be used to send bulk materials and spacecraft fuel to the Earth's orbit.
