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Mitigation of Earth-asteroid collisions via explosive, intense radiation sources AARON MILES, Lawrence Livermore National Laboratory, JAMES SANDERS, Lawrence Livermore National Laboratory and University of Oregon — The Universe is continually producing astrophysical explosions that generate intense bursts of electromagnetic and particle radiation. Interaction of this radiation with nearby objects can effect significant changes to their dynamics through a variety of processes including ionization, ablation, and shock generation. The next time a large asteroid or comet is found to be approaching the Earth on an impact trajectory, humans may find it prudent to mimic nature by using the most intense radiation sources available to alter the incoming object's trajectory and avert a catastrophic collision. With this in mind, we consider the effect of nuclear explosives on nearby would-be Earth impactors. Neutrons and x-rays produced in the explosion are deposited in a thin layer of the asteroid's surface, resulting in ablation and shock and thereby imparting a deflection velocity. A Monte Carlo code is used for radiation transport and energy deposition, while the subsequent dynamic evolution of the asteroid is followed with the hydrodynamics code CALE. We consider the dependence of the deflection velocity on the source energy and spectrum, the asteroid or comet composition, and the standoff distance between the target and the source. This work was performed under the auspices of the U. S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

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