

Could a 'Death Star' really destroy a planet?

January 19 2012, By Ray Sanders



The Death Star. Image Credit: Wookieepedia / Lucasfilm

Countless Sci-Fi fans vividly remember the famous scene in *Star Wars* in which the Death Star obliterates the planet Alderaan.

Mirroring many late night caffeine-fueled arguments among Sci-Fi fans, a University of Leicester researcher asks the question:

Could a small moon-sized battle station generate enough energy to destroy an Earth-sized planet?

A paper by David Boulderston (University of Leicester) sets out to answer that very question. First, for the uninitiated, just what the heck is a Death Star?

According to *Star Wars* lore, the DS-1 Orbital Battle Station, or Death Star, is a moon-sized battle station designed to spread fear throughout the galaxy. The image above shows the Death Star as it appeared in *Star Wars* Episode IV: A New Hope (1977). The Death Star's main weapon is depicted as a superlaser capable of destroying [planets](#) with a single blast.

Boulderston claims that it is possible to estimate how much energy the Death Star would need in order to destroy a planet with its superlaser. There are a number of assumptions made, however, in order to come up with the energy requirement.

For starters, Boulderston assumed that Alderaan did not have any sort of planetary “deflector” shield. A second assumption is that the planet is a solid body of uniform density – essentially ignoring the complex interior of planets, due to lack of information on Alderaan itself. Using the idealized sphere model based on [Earth](#)'s mass and diameter, it was possible to determine the gravitational binding energy of Alderaan, using a simple equation of:

$$U = \frac{3}{5} GM_p^2 / R_p$$

5R_p

Where G is the Gravitational Constant (6.673×10^{-11}), M_p is planet mass, and R_p is the planet's radius. Using Earth's mass and radius, the required energy comes out to 2.25×10^{32} Joules. Using Jupiter's data, the energy required goes up to 2×10^{36} Joules.

Boulderston asserts that (according to [Star Wars](#) lore) the Death Star is powered by a ‘hypermatter’ reactor, possessing the energy output of several main-sequence stars. Given that the power output of our Sun is about 3×10^{26} Joules per second, it's a reasonable assumption the Death

Star's reactor could power the superlaser.

Despite using a simplified model of a planet, Boulderstone states the simplified model is reasonable to use since the Death Star's main power reactor has the energy output equal to several main-sequence stars. Even if Earth's exact composition were used in the equation above, the required energy to destroy a planet would only be affected by a few orders of magnitude – well within the Death Star's power budget.

Boulderstone reiterated that the [energy](#) required to destroy a Jupiter-sized planet would put considerable strain on the Death Star. To destroy a planet like Jupiter, all power from essential systems and life support (no re-routing from the auxiliary EPS conduits – that's a *Star Trek* hack!) would be required, which is not necessarily possible.

Boulderstone's conclusion is that the Death Star could indeed destroy Earth-like planets, given its main power source. While the Death Star could destroy an Earth-sized planet, a Jupiter-sized planet would be a tough challenge, and the Galactic Empire would need to resort to using a Suncrusher to destroy stars.

If you'd like to read Boulderstone's paper, you can access it at:
physics.le.ac.uk/journals/index.php/article/view/328/195

Source: [Universe Today](#)

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