

Thor's hammer is not that heavy—but it is scientifically interesting

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In early February, astrophysicist Neil deGrasse Tyson said on Twitter that the superhero Thor's Hammer (aka Mjolnir) "weighs as much as a herd of 300 billion elephants." News outlets pounced on this, and the news was quickly circulating online. Sadly, Tyson was wrong.

Tyson's reasoning was based on the idea that Mjolnir was "made of neutron-star matter." Not so fast.

"The critical mistake Tyson makes is thinking that Mjolnir was forged of the [core](#) of a dying star, when it was actually forged in the core of a [dying star](#)," says Suveen Mathaudhu, a program manager in the materials science division of the U.S. Army Research Office, adjunct materials science professor at NC State and die-hard comics enthusiast. "It's well documented that the hammer is made out of 'Uru,' a fictional metal from Thor's native realm of Asgard."

And Mathaudhu can cite documentary sources to back him up. For example, Marvel – which publishes the Thor comics – issued a "Thor's Hammer" trading card in 1991 that states Mjolnir is made of Uru and weighs precisely 42.3 pounds. That's lighter than a herd of 300 billion mice, much less a herd of 300 billion elephants. But it raises a different science question.

Using the dimensions and weight on Marvel's trading card, Mathaudhu estimates that the density of Mjolnir is about 2.13 grams (g) per cubic centimeter (cc). That makes it even lighter than aluminum, which has a

density of 2.71 g/cc. So what could possibly be that light and strong?

Mathaudhu has a theory.

"Perhaps Uru is the 'holy grail' of high-pressure physics: a form of [metallic hydrogen](#)," Mathaudhu says. "Some predictions of the density of metallic hydrogen fall into this range, it requires extreme conditions to form, and could be a tremendous energy source. It's thought to be present at the core of planets, such as Jupiter, and at the core of suns – which are stars, after all."

While Tyson made a mistake in calculating the weight of Thor's hammer, he succeeded in drawing attention to the sciences of astrophysics and materials science – which is a good thing.

Provided by North Carolina State University

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