The Energy Budget of Solar Flares

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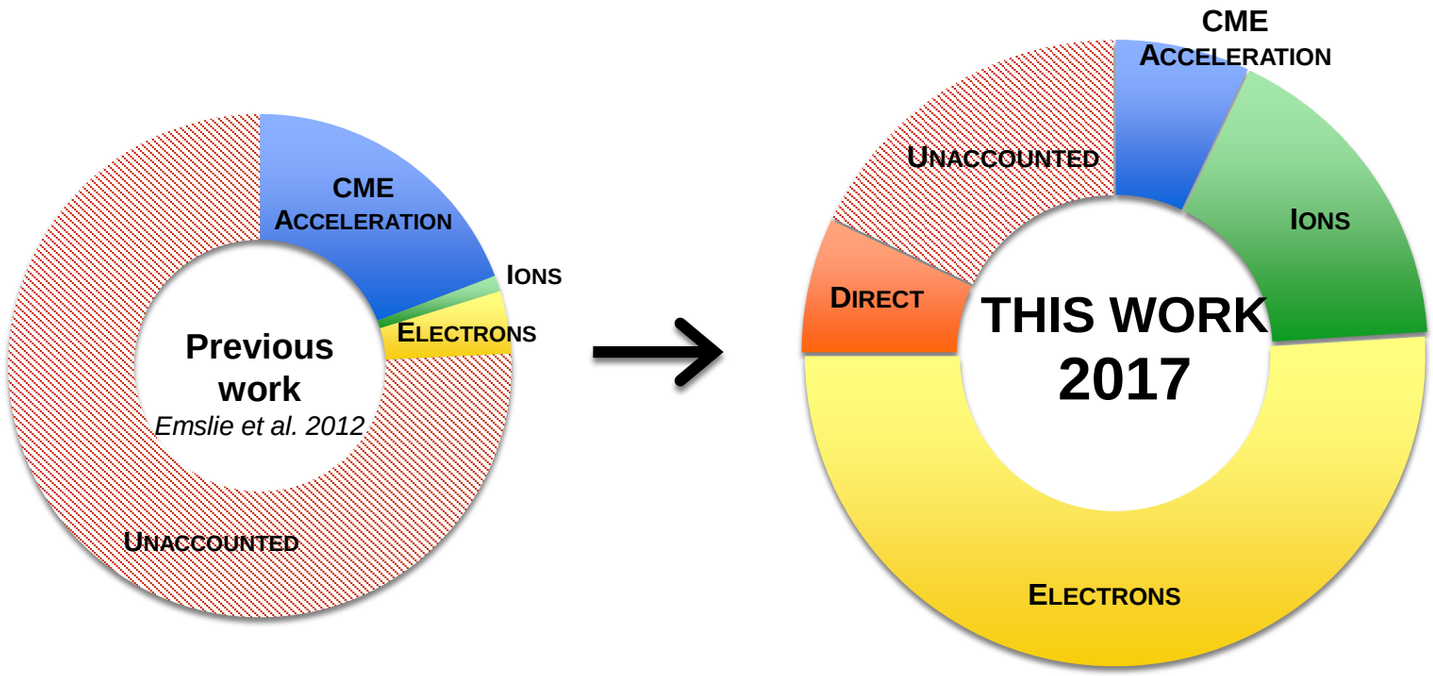
What is the science question?

When a solar flare erupts, where does the energy go?
There has long been a problem in solar flare energy accounting: the individual energetic parts never add up to the total energy released.



What were your findings?

A comprehensive study of 172 flares completely changes our understanding of where flare energy is deposited. The direct heating of plasma, heating non-thermal electrons and ions, and accelerating coronal mass ejections (CMEs) now can account for 82% of the magnetic energy released in a typical flare.

What was the impact?

This work unifies several isolated models of how individual parts of solar flares and CMEs erupt. Magnetic energy released in flares is directed into several physical processes. These new constraints dictate how much energy from a given flare can be allocated into each for further modeling and analysis of the roots of space weather.

Why does it matter to non-scientists?

Unraveling the flare energy budget will help us understand how flares erupt on the sun and how much energy will be directed toward the Earth. Helping us to better protect our technological society from space weather.

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