

Looking for the brightness of dark matter

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We can state one thing with confidence: there's more *stuff* in our galaxy than we can see. If the galaxy were only made up of what we see, its gravity would not be strong enough to keep the outer stars from flying away as the galaxy rotates. Therefore, there is plenty of matter that is in our galaxy that we cannot see – we call it dark matter. To find dark matter, we must create devices that are extremely sensitive to this matter that interacts so weakly with our world. In HAYSTAC, we use strong magnetic fields to convert a type of dark matter called axions into light. But just how a guitar without a body will not be loud, a photon without a resonator will not produce a strong signal. Our work requires us to create devices that resonate loudly to create a bright photon but also amplifiers that pick up weak signals, so we can know that we can see the axion signal if it is there. If we are able to observe this particle, we might be able to state that we went from understanding 5% of our universe to 30% percent!

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