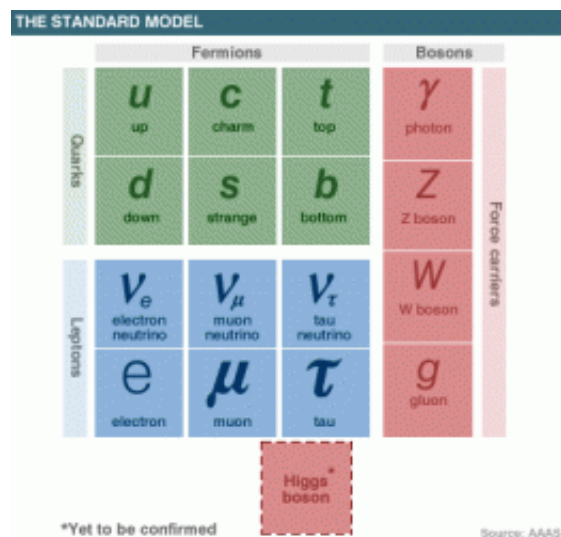


# Possible case for fifth force of nature

May 26 2016, by Bob Yirka



The Standard Model. Image credit: AAAS

A team of physicists at the University of California has uploaded a paper to the *arXiv* preprint server in which they suggest that work done by a team in Hungary last year might have revealed the existence of a fifth force of nature. Their paper has, quite naturally, caused quite a stir in the physics community as several groups have set a goal of reproducing the experiments conducted by the team at the Hungarian Academy of Science's Institute for Nuclear Research.

The work done by the Hungarian team, led by Attila Krasznahorkay, examined the possible existence of dark photons—the analog of conventional photons but that work with dark matter. They shot protons

at lithium-7 samples creating beryllium-8 nuclei, which, as it decayed, emitted pairs of electrons and positrons. Surprisingly, as they monitored the emitted pairs, instead of a consistent drop-off, there was a slight bump, which the researchers attributed to the creation of an unknown particle with a mass of approximately 17 MeV. The team uploaded their results to the *arXiv* server, and their paper was later published by *Physical Review Letters*. It attracted very little attention until the team at UoC uploaded their own paper suggesting that the new particle found by the Hungarian team was not a dark photon, but was instead possibly a protophobic X boson, which they further suggested might carry a super-short [force](#) which acts over just the width of an atomic nucleus—which would mean that it is a force that is not one of the four described as the fundamental forces that underlie modern physics.

The [paper](#) uploaded by the UoC team has created some excitement, as well as public exclamations of doubt—reports of the possibility of a fifth force of nature have been heard before, but none have panned out. But still, the idea is intriguing enough that several teams have announced plans to repeat the experiments conducted by the Hungarian team, and all eyes will be on the DarkLight experiments at the Jefferson Laboratory, where a team is also looking for evidence of [dark](#) photons—they will be shooting electrons at gas targets looking for anything with masses between 10 and 100 MeV, and now more specifically for those in the 17 MeV region. What they find, or don't, could prove whether an elusive fifth force of nature actually exists, within a year's time.

**More information:** [arxiv.org/pdf/1604.07411v1.pdf](https://arxiv.org/pdf/1604.07411v1.pdf)

A. J. Krasznahorkay et al. Observation of Anomalous Internal Pair Creation in: A Possible Indication of a Light, Neutral Boson, *Physical Review Letters* (2016). [DOI: 10.1103/PhysRevLett.116.042501](https://doi.org/10.1103/PhysRevLett.116.042501)

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