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Light in the dark: GW190521 as Proca star merger

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The detections of gravitational waves are opening a new window to the Universe. The nature of black holes and neutron stars may now be unveiled, but gravitational radiation may also lead to exciting discoveries of new exotic compact objects, oblivious to electromagnetic waves. In particular, Advanced LIGO-Virgo recently reported a short gravitational-wave signal (GW190521) interpreted as a quasi-circular merger of black holes, one at least populating the pair-instability supernova gap. We found that GW190521 is also consistent with numerically simulated signals from head-on collisions of two (equal mass and spin) horizonless vector boson stars (aka Proca stars). This provides the first demonstration of close degeneracy between these two theoretical models, for a real gravitational-wave event.

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