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Dark photon dark matter search at the TASEH experiment

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The dark photon is a well motivated candidate for the dark matter. A primary tool in this search is the cavity haloscope, which facilitates resonantly enhanced conversion to photons from dark photons. We re-examining the data taken by the Taiwan Axion Search Experiment with Haloscope (TASEH) experiment, and derive a world-leading constraint on the dark photon with mass in the 19.46 - 19.84 μeV mass range. The bound exceeds the naive 'rescaling limit' by roughly one order of magnitude. In this data, we also identify a tentative signal with a local significance of 4.7 σ, previously disregarded due to an axion-specific veto, corresponding to a dark photon with mass ~ 19.5 μeV.

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