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## **Horava-Lifshitz and Einstein-Aether Gravity in the light of Event Horizon Telescope Observations of M87**

*Tuesday, 6 July 2021 11:40 (25 minutes)*

We investigate Horava-Lifshitz Einstein- Aether gravity in light of the recent Event Horizon Telescope (EHT) observations of the M87. *The shape and size of the observed black hole shadow contains information of the geometry in its vicinity, and thus one can consider it as a potential probe to investigate different gravitational theories, since the involved calculation framework is enriched with different size-rotation features as well as with extra model parameters. We calculate the corresponding photon effective potential, the unstable photon sphere radius, and finally the induced angular size, which combined with the mass and the distance can lead to a single prediction that quantifies the black hole shadow, namely the diameter per unit mass  $d$ . Since  $d_{M87^*}$  is observationally known from the EHT Probe, we extract the corresponding parameter regions in order to obtain consistency. We find that Horava-Lifshitz and Einstein-Æther black hole solutions agree with the shadow size of EHT M87, if the involved Æther parameters are restricted within specific ranges, along with an upper bound on the dimensionless spin parameter  $a$ , which is verified by a full scan of the parameter space within 1 sigma-error.*

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