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# **The spherical expansion of the kilonova AT2017gfo/GW170817**

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The mergers of neutron stars expel a heavy-element enriched fireball which can be observed as a kilonova. The kilonova's geometry is a key diagnostic of the merger and is dictated by the properties of ultra-dense matter and the energetics of the collapse to a black hole. Current hydrodynamical merger models typically show aspherical ejecta. Previously, Sr<sup>+</sup> was identified in the spectrum of the the only well-studied kilonova AT2017gfo, associated with the gravitational wave event GW170817. Here we combine the strong Sr<sup>+</sup> P Cygni absorption-emission spectral feature and the blackbody nature of kilonova spectrum, to determine that the kilonova is highly spherical at early epochs. Line shape analysis combined with the known inclination angle of the source also shows the same sphericity independently. We conclude that energy injection by radioactive decay is insufficient to make the ejecta spherical. A magnetar wind or jet from the black-hole disk could inject enough energy to induce a more spherical distribution in the overall ejecta, however an additional process seems necessary to make the element distribution uniform.