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## Atomic Structure Calculations in Lanthanide and Actinide ions relevant to kilonovae

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The observation of the near-infrared emission from binary neutron-star merger events, often known as kilonova, has increased the confidence that these astrophysical sources are the potential sites of heavy r-process nucleosynthesis. This emission is present in the observations of the gravitational-wave signal (GW170817) by LIGO/Virgo and is consistent with an electromagnetic transient emission of a kilonova. However, data of opacities, necessary for the interpretation of these observations, relies heavily on atomic structure calculations of both lanthanides and actinides, which is still very sparse. In this work we discuss the details of these calculations and some of the limitations imposed by the complexity of f-shell elements. Besides reviewing some previous results, we compare them with our present calculations based on the atomic structure codes FAC and MCDFGME. We study the combined effect of transition wavelengths and oscillator strengths on the opacities and how energy precision can be important at lower wavelengths. Finally, we discuss how higher sensitivity of the opacity curve at higher energies can be exploited, looking for features of specific lanthanides and actinides present in kilonovae.

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