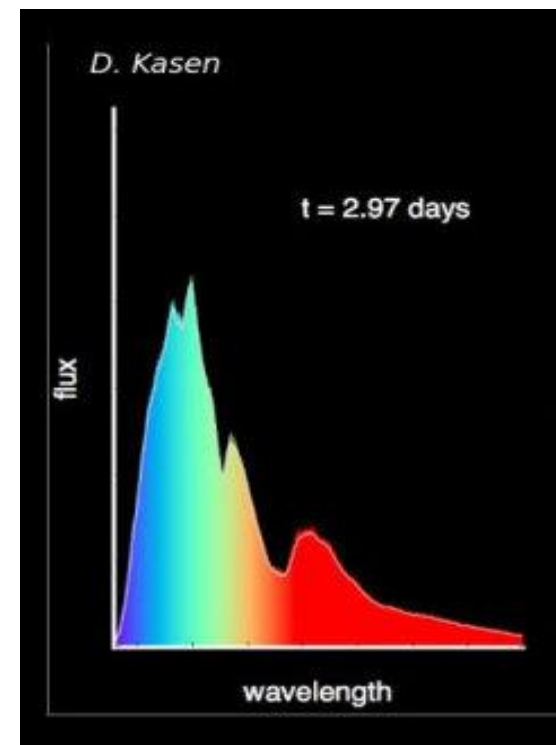


Open Challenges to Nuclear Physics Resulting from The Neutron Star Merger event GW170817

The GW170817 observation of gravitational waves resulting from the merger of two neutron stars in a constellation 132 million light years away, still promises to be one of the most significant discoveries of the 21st century. The gravitational waves along with 70 electromagnetic transients solved one of the open challenges of physics and astrophysics about a site for the r-process (rapid neutron capture) and the synthesis of the heavy elements. However, it also triggered a number of unresolved nuclear physics questions.

- Is fission of extremely neutron rich nuclei similar to what we have studied in the laboratory for decades?
- If the actinides are made, then by necessity fission will have a significant role. What evidence do we have of exotic fission modes?
- Were the super-heavies made in this process?



The wavelength of light seen from the source of the gravitational waves as a function of time. The warm color region is thought to be created by the synthesis of the lanthanides. The figure is made from the data observed by the authors of *Ap. J. Lett.* 848, L18 (2017).