Super-Luminous Supernovae (SLSNe)

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Super-luminous supernovae (SLSNe) are stellar explosions that overshine normal supernovae by 10 to 100 times. They are so rare that they were discovered only one decade ago. Their high luminosity makes them potentially useful to study the early universe and to measure distances to much further distance than normal events. However, their physical origin remains elusive. Radioactivity, the main power source among normal supernovae, cannot explain the large luminosities of most SLSNe. Some alternative mechanisms have been proposed that explain the extra energy required to produce a SLSN. The most plausible ones involve a strong shock between the supernova ejecta and dense surrounding material, or a newly born rapidly rotating and strongly magnetized neutron star called *magnetar*. We have recently analyzed two unusual SLSNe, SN 2011kl and ASASSN-15lh, and found that they can understood in the context of magnetar-powered SNe.