Extreme Electromagnetism: Magnetars

When I think of the term ‘electromagnetism’ I think of two things: electromagnetic waves and “Oh, ~~electro~~magnetism is really interesting!” So naturally, a star that has had it’s protons and electrons compressed together into neutrons while also producing the largest magnetic field in the universe comes to mind for this project. I’ve heard bits and pieces about magnetars over the years (Heart-Shaped Box by Nirvana comes to mind), but the mystery behind them tended to follow as well. I new what neutron stars, pulsars, and quasars were, but the one that I was never fully able to investigate was these beasts, so here’s my chance.

Magnetars are a type of neutron star theorized in 1992 that create a magnetic field so strong that they literally warp anything from atoms and individual electrons to photons. They are capable of releasing very violent burst of gamma radiation when they experience a so-called ‘starquake’, where the surface of the neutron star cracks and expels some of the inner radiation. Magnetars also tend to spin faster than a traditional neutron star (spinning because of the conservation of angular momentum after the supernova creating the neutron star) and have been used to explain soft gamma repeaters and anomalous x-ray pulsars. Another intriguing aspect is that magnetars do not have a long active life, and we aren’t entirely sure *why* they have such a strong magnetic field.

Papers:

<http://iopscience.iop.org/article/10.1086/311813/pdf>

<http://iopscience.iop.org/article/10.1088/2041-8205/719/2/L204/pdf>

<http://solomon.as.utexas.edu/sciam.pdf>

<http://articles.adsabs.harvard.edu/full/1992ApJ...392L...9D/L000009.000.html>

<https://web.archive.org/web/20130517180957/http://solomon.as.utexas.edu/~duncan/magnetar.html>