The soft gamma-ray repeaters

Kevin Hurley[1]

[1]UC Berkeley Space Sciences Laboratory, Berkeley, CA 94720-7450

ABSTRACT: The soft gamma-ray repeaters (SGRs) are one manifestation of magnetars, which are neutron stars with magnetic field strengths $\sim 10^{15}$ G. Although we know of only four of them, they are fascinating objects with very unusual properties. I will discuss SGRs starting with a brief historical overview, and concentrate on X- and gamma-ray observations. I will discuss their quiescent and bursting emission, energy spectra, periodicities, energetics, giant flares, and some of the more controversial observations, such as X-ray lines. I will introduce the magnetar model and show how it explains many of the observational features of SGRs. Finally, I will discuss the possibility of observing extragalactic giant flares, and how such flares might explain some of the short- duration cosmic gamma-ray bursts, and how future observations can support this possibility.