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Broadband Modeling of the GRB Prompt Emission from Optical to Gamma-Rays SYLVAIN GUIRIEC, George Washington University / NASA Goddard Space Flight Center — Despite more than 5,000 detected Gamma-Ray Bursts (GRBs), the nature of the prompt emission and the physical mechanisms powering the GRB relativistic jets are still strongly debated. During the past years, several studies showed that the gamma-ray prompt emission spectra are more complex than the smoothly broken power-law traditionally used. New models emerged, and among them, the three-component model that we propose provides an excellent description of the broadband time-resolved prompt emission of both short and long GRBs from optical to high-energy gamma-rays: (i) a quasi-thermal component interpreted as emission from the jet photosphere, (ii) a non-thermal component interpreted as synchrotron radiation from accelerated electrons within the jet; and (iii) a second non-thermal component, which may be related to magnetic reconnections downstream the jet. Moreover, this model enables a new luminosity/hardness relation suggesting that GRBs may be standard candles; this relation may reveal the underlying physics behind the famous Amati, Ghirlanda, and Yonetoku relations. I will present this three-component model using GRBs detected with Fermi, CGRO/BATSE, Swift+Suzaku/WAM, and Wind/Konus. I will discuss the striking similarities of all GRBs using this model and the possible universality of the derived luminosity/hardness relation.

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