X-ray polarization in context of GRBs (#1295)

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Gamma Ray Bursts were originally discovered in soft gamma-rays. 20 years ago, the extension of the observations to X-rays, allowed for the discovery of afterglows immediately extended to the optical and radio bands that allowed to measure the distances and to fix the extragalactic nature of the phenomenon and the huge energetics.
So far, in practice, the extension to other wavelengths has been the key to improve our understanding the nature of GRBs.
Waiting for the detection of new messengers, a further extension of the information associated to the electro-magnetic messenger is to be foreseen.
In other domains of High Energy Astrophysics a significant evolution is expected in the forthcoming years, thanks to the introduction of sensitive techniques of X-ray polarimetry. The photoelectric detector in the focus of an X-ray telescope allows for a jump in the sensitivity to detect linear polarization of sources. Haw can this technique be applied to GRBs? I discuss what can be done with the approved mission.
Polarimetry is a photon starving branch of X-ray Astronomy. But the new sensitive techniques are strictly confined to narrow field telescopes. This means that it is only feasible with the very early afterglow, the transition phase and flares and and is to be compared with what has been found or claimed in the field of optical polarimetry.
For the prompt event only wide field techniques are viable. By using as a polarimeter instruments built with other purposes, and small prototypical instruments, high polarization levels have been claimed in the prompt emission in the soft gamma-ray band for some very bright burst.
I discuss the limits and merits of these measurements and the possibility to combine these data with measurements with narrow field instruments.
I also discuss which role could polarimetry have to understand the physics of the GRB.
I also discuss the possibility to use the GRB polarimetry to test the effects deriving from the propagation at very long distances predicted by some theories of fundamental physics