

Searching the heavens -- GLAST

A new space mission, due to launch this month, is going to shed light on some of the most extreme astrophysical processes in nature - including pulsars, remnants of supernovae, and supermassive black holes. It could even help us comprehend the origin and distribution of dark matter, write three scientists currently preparing for the GLAST mission from NASA's Goddard Space Flight Centre in Greenbelt, Maryland, USA, in this month's Physics World.

The Gamma-Ray Large Area Space Telescope (GLAST), to be launched on 16 May 2008, is a four-tonne observatory packed with state-of-the-art particle detectors that will study the gamma-ray sky in unprecedented detail.

Gamma rays are a form of electromagnetic radiation with much higher frequency and energy than visible light, UV light or even X-rays. Having such high energy, gamma rays are hard to collect and focus in the way that a conventional telescope does with visible light. Gamma rays are therefore the most difficult form of electromagnetic radiation to track in space.

Whereas visible light reveals thousands of stars and individual planets moving slowly across the sky, studying the skies at gamma-ray frequencies reveals a much weirder picture of space.

Gamma rays are not produced by hot, glowing objects, but from collisions between charged, very rapidly moving, particles and matter or light. The high frequency photons that are emitted from these collisions provide a glimpse of the most extreme astrophysical processes known.

Black holes, for example, accelerate matter to produce extreme energies in active galaxies. The gamma rays emitted in these scenarios have the equivalent energy to that of all the stars in an entire galaxy over all wavelengths.

Until now, however, existing ground-based gamma-ray detectors have not been sophisticated enough to measure these emissions in any detail over long periods. The astrophysicists cite looking for signatures of as-yet-unknown fundamental physical processes as a key reason for embarking on this project.

Julie McEnery, Steve Ritz and Neil Gehrels of NASA's Goddard Space Centre, write, "We expect GLAST to have a large impact on many areas of astrophysics but what is most exciting are the surprises: with any luck, the greatest GLAST science has not even been thought of yet."

Source: Institute of Physics

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