

Colloquium Notice

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Sixty Years of Solar and Celestial Gamma-Ray Astronomy

Gamma rays comprise the highest energy band of the electromagnetic spectrum. Much of the celestial and solar radiation in this band could only be studied once instruments were carried above most of the Earth's atmosphere by large balloons or by satellites around 1960. The instruments had their heritage in the nuclear and particle physics communities and encountered challenges due to their weight and the severe background radiation that they encounter. Tremendous strides have been made since then. With current space gamma-ray instruments spanning the energy range from a fraction of an MeV (million electron volts) to hundreds GeV, the sky is both static and highly variable. Most clearly visible at energies above 100 MeV, there is a faint isotropic glow from objects in the early universe and a striking band of radiation from our milky way galaxy produced by discrete stellar-like objects, such as pulsars, and from radiation produced when cosmic rays interact with the interstellar medium. In the MeV nuclear energy range, diffuse galactic emission is observed in lines from the annihilation of positrons and decay of radioactive nuclei in the relics of stellar explosions. Gamma-ray bursts sometimes reaching energies of 100 MeV range and typically lasting seconds to minutes occur a few times a day announcing a stellar explosion in the early universe. Flares from the thousands of detected active galactic nuclei powered by massive black holes occur a few times a year. The Sun is faintly observed above 100 MeV as it moves along the ecliptic plane with radiation produced by cosmic-ray interactions. The Sun is mostly dark as viewed at MeV energies except during periods of high solar activity when flares accelerate electrons and ions to high energies which then interact in the solar atmosphere producing electron bremsstrahlung and nuclear gamma-ray lines lasting for minutes to hours. These lines provide both information on the solar elemental abundances and on the composition and directionality of the accelerated ions. I will highlight some of the studies that I am most acquainted with since I graduated from Queens College in 1961.

Note: This talk was recorded and can be accessed [here](#).

Monday
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Starts at 12:15 PM
zoom.us