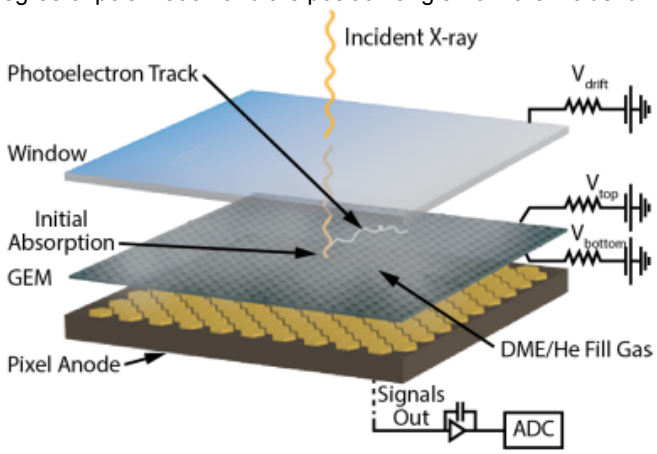
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

IXPE
Imaging X-Ray Polarimetry Explorer

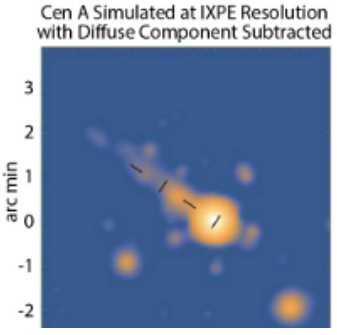
How Do We Detect Polarized X-ray Light?

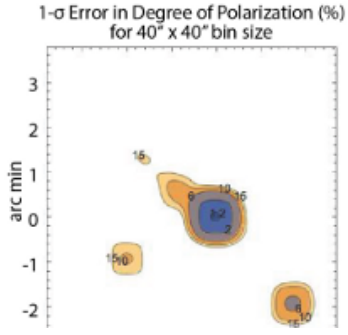
IXPE will have three identical X-ray telescopes, with polarization detectors at each focus. The detectors, called Gas Pixel Detectors (GPD) are based on proportional counters (see Mullard Space Science Laboratory's *Introduction to Proportional Counters)*. Polarized X rays interacting with a gaseous medium create photoelectons that are preferentially emitted in the polarization direction. Photoelectron tracks mark the path of the photoelectron from the position of the initial X-ray interaction to its stopping point. Analysis of the distribution of the initial directions of the tracks gives the degree of polarization and the position angle from the incident X ray.



The Benefits of Imaging

The brightest extended X-ray sources can be polarimetrically imaged by IXPE. Examples include an Active-Galactic-Nucleus (AGN) jet, Pulsar Wind Nebulae (PWNe), and shell-type Supernova Remnants (SNR). Polarization maps of these sources will show the structure of the magnetic field of X-ray emitting regions, which may be different from regions emitting in radio or the visible portion of the spectrum. Imaging also yields a more sensitive measurement of a point source embedded in an extended source than a non-imaging system.





For

more information, see the SPIE Edinburg 2016 paper and the microarticle for *Results in Physics*.

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