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NASA TECH BRIEF

Manned Spacecraft Center

A Liquid Radiation Detector With High Spatial Resolution

A radiation detector using a liquid argon or xenon electron multiplication medium may improve spatial resolution an order of magnitude or more over the present 0.5 millimeter. The device operates in a manner similar to conventional gas-filled detectors, but by using a dense liquid medium, it promises to meet all present or expected resolution requirements.

Preliminary development, using a point anode, has proven successful. In addition to improving resolution over multi-wire or position sensitive counters using charge division or rise-time, the point anode minimizes the problem of oblique tracks by permitting the construction of a very thin (one to five millimeter) counter.

Still in its early developmental stages, the system has some disadvantages. Maximum observed efficiency is currently 30 per cent in liquid xenon, and 1 to 2 per cent in liquid argon. This could pose a problem in some applications, particularly medical. Liquid argon requires a cryogenic environment, and liquid xenon is expensive and would require elaborate recovery equipment.

Despite its limitations, the liquid medium system may prove to be a major development. In a two-dimensional configuration, it could be a superior imaging device for X-rays, providing high speed and improved resolution. The intended and most obvious application is for cosmic ray and high energy physics research. Other uses exist in the area of X-ray and neutron diffraction technology.

Note:

Requests for further information may be directed to:

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No patent action is contemplated by NASA.

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