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## Cygnus Precision Dosimetry –Calibration and Measurements

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The Cygnus Dual Beam Radiographic Facility consists of two identical radiographic sources each with a dose rating of 4-rad at 1 m, and a 1-mm diameter spot size. The development of the rod pinch diode was responsible for the ability to meet these criteria<sup>1</sup>. The rod pinch diode in a Cygnus machine uses a 0.75-mm diameter, tapered tip, tungsten anode rod extended through a 9-mm diameter, aluminum cathode aperture. When properly configured, the electron beam born off the aperture edge can self-insulate and pinch onto the tip of the rod creating an intense, small x-ray source. The Cygnus sources are utilized as the primary diagnostic on Subcritical Experiments that are single-shot, high-value events. In such an application, there is a necessity for reliability and reproducibility is dosimetry. Thermoluinescent<sup>2</sup> dosimeters (TLDs) are used for time-integrated dose, and PIN diodes are used for time-resolved dose. Precision dosimetry calibration methods and results will be presented. Cygnus reliability and reproducibility using TLD dosimetry measurements will be given.

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- 1. G. Cooperstein et al., "Theoretical Modeling and Experimental Characterization of a Rod-Pinch Diode," in Physics of Plasmas, Vol. 8, Number 10, October 2001.
- 2. J. Smith et al., "Performance of the Cygnus X-ray Source" in Proceedings of the 15th IEEE Pulsed Power Conf., 13-17 June 2005, pp. 334-337.

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