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New drift chamber electronics for high energy gamma ray telescopes

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Abstract

The next generation gamma ray telescope is envisioned as a “2 meter class” instrument, a picture type detector using large area ($2\text{ m} \times 2\text{ m}$) drift chambers for the imaging detector. Low power amplifier, discriminator and time-to-digital converter (TDC) circuits are crucial to the development of large area drift chambers for use in space where power is limited. We discuss the design for an amplifier, discriminator and quad TDC which will operate within an estimated power budget of 200 mW per anode for an instrument using large area drift chambers. The amplifier has a discriminator has a 12 ns propagation time, 15 ns rise time, 25 ns pulse width and 25 mW power. The quad TDC has a power of 95 mW, 12 bit resolution and RMS error less than 0.2% full scale.

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