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Novel methods for identifying the cause of inherent ageing in Electron Multiplying Charge Coupled Devices

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The pre-amplifier, multi-stage, charge multiplication process used in the Electron Multiplying CCD (EMCCD) is subject to an ageing effect in which the gain achieved at particular avalanche potentials, decreases during operation. To utilise these devices for both space and terrestrial applications where recalibration of the gain is not feasible a comprehensive understanding of the ageing process is required.

The Automated Test Equipment (ATE) is a fully automated testing environment and has been used to develop advanced techniques to investigate the ageing process. In a novel experiment changes in the potential of the DC phase are observed. These shifts are caused by hole build up at the Si/SiO₂ interface below the gate and give rise to a lower avalanche potential. The results detailed in this work may provide a greater understanding of the Electron Multiplying ageing process.

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Poster

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