**Determination of LAGEOS-2 spin from photometric observation: (1) Evolution of spin motion and orientation**

**System concepts**

The Photometry system at Herstmonceux has been designed to allow easy operation and simultaneous SLR and photometry data collection.

**Development History**

The first LAGEOS 2 photometry gathered at Herstmonceux was in March 2000 with 20ms time resolution. The system was upgraded in Nov 2001 to allow 1ms time resolution. This avoids confusion with laser pulses during simultaneous SLR observations.

**Formation of solar flashes**

Raw data from a typical LAGEOS 2 observation. The area of higher noise density in the centre is when the laser is firing (when the satellite is above 30° elevation). The sets of LAGEOS flashes are the wider dense spikes. Stars passing through the iris show up as the narrow spikes.

**Analysis procedure**

The plot above shows the whole range of data present in a typical LAGEOS 2 data set. The laser spikes are easily distinguished from LAGEOS 2 flashes both by amplitude and their very short duration. LAGEOS 2 flashes are far longer > 10ms and can be distinguished from stars by their regular pattern. The satellite flashes are extracted by means of a median filter.

**NSGF Photometry System Schematic**

**Results**

The plot to the left shows the complete history of LAGEOS 2 spin rate observations at Herstmonceux. The data follow a smooth approximately exponential curve, giving a slowdown rate of 37.4% per year. The colours show the different numbers of CCR’s in the rings from which the flashes originated. The periods of no data correspond to times when LAGEOS 2 was only visible in the daytime from Herstmonceux. On the right is the spin axis history. The axis can be seen to trace a slow precession motion.