A High Foreground of Sub-second Glints

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The sample. We discovered point-like, sub-second duration flares of *unknown origin*. Some of the flares coincided with bright stars, some did not have apparent hosts. The magnitude of the flares was 9-11 (GAIA B_p equivalent). The duration of the flares was 0.05-0.3s.

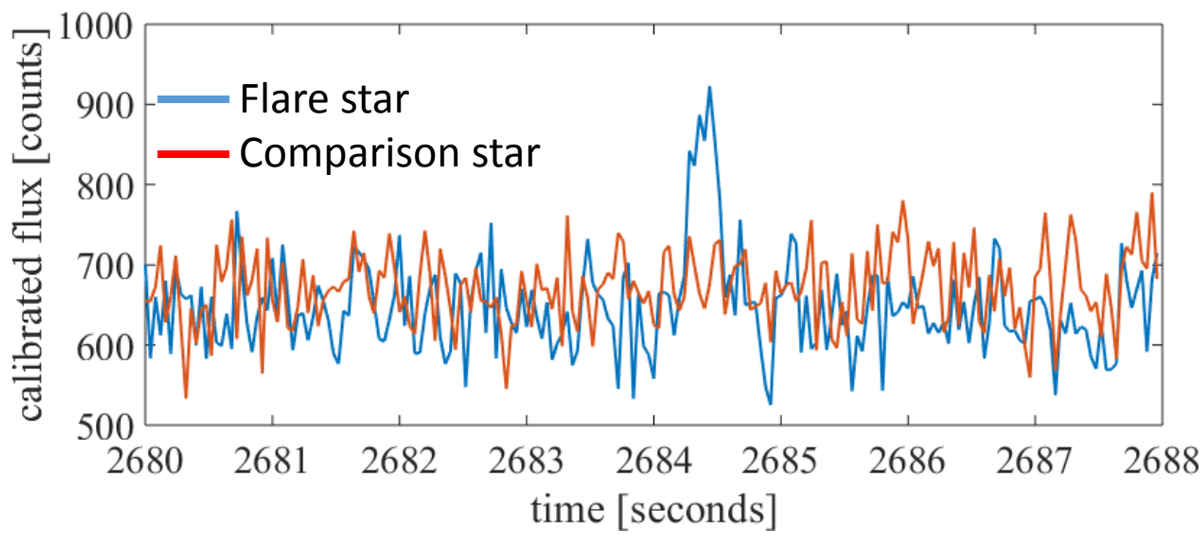

Fig 1. An example lightcurve for two stars in the same field, with the blue curve showing a typical flare. The star brightens by ~50% in less than a second.

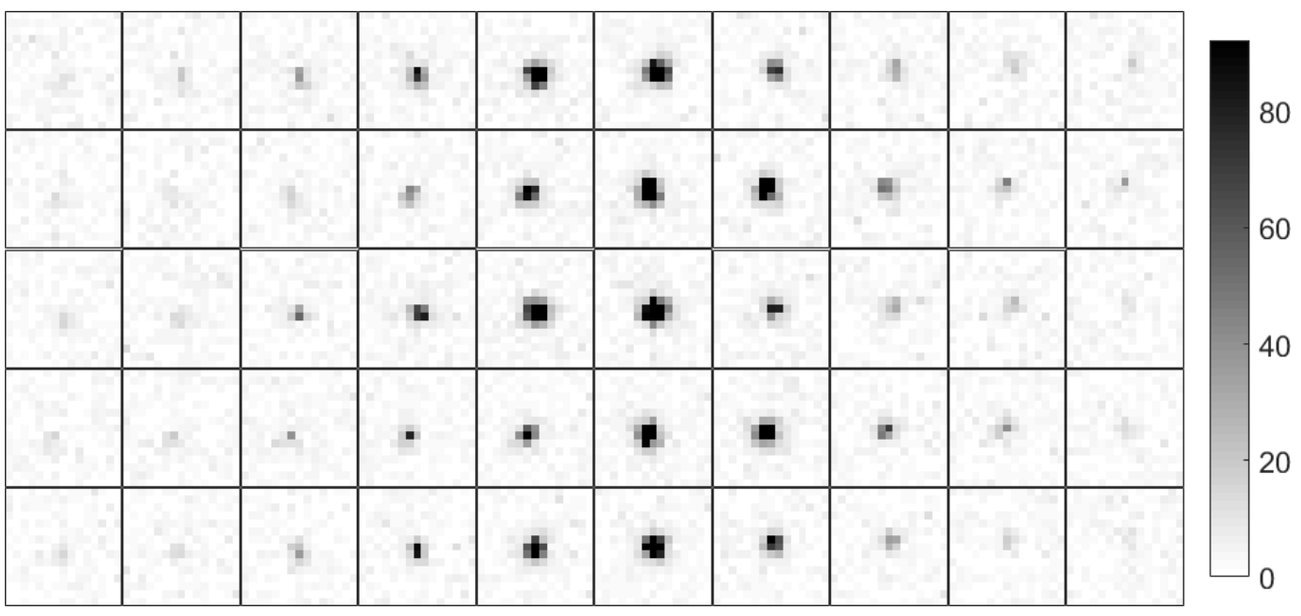

Fig 2. Each row is a single flare event, each square an individual image taken 40ms apart. Flares were observed a few tens of seconds apart in different parts of the field.

Possible sources of sub-second optical transients:
FRB or GRB counterparts, dwarf-star flares, etc.

However: stars do not brighten by 50% in 0.2s, FRB counterparts are not so bright, GRB flashes are not so common.

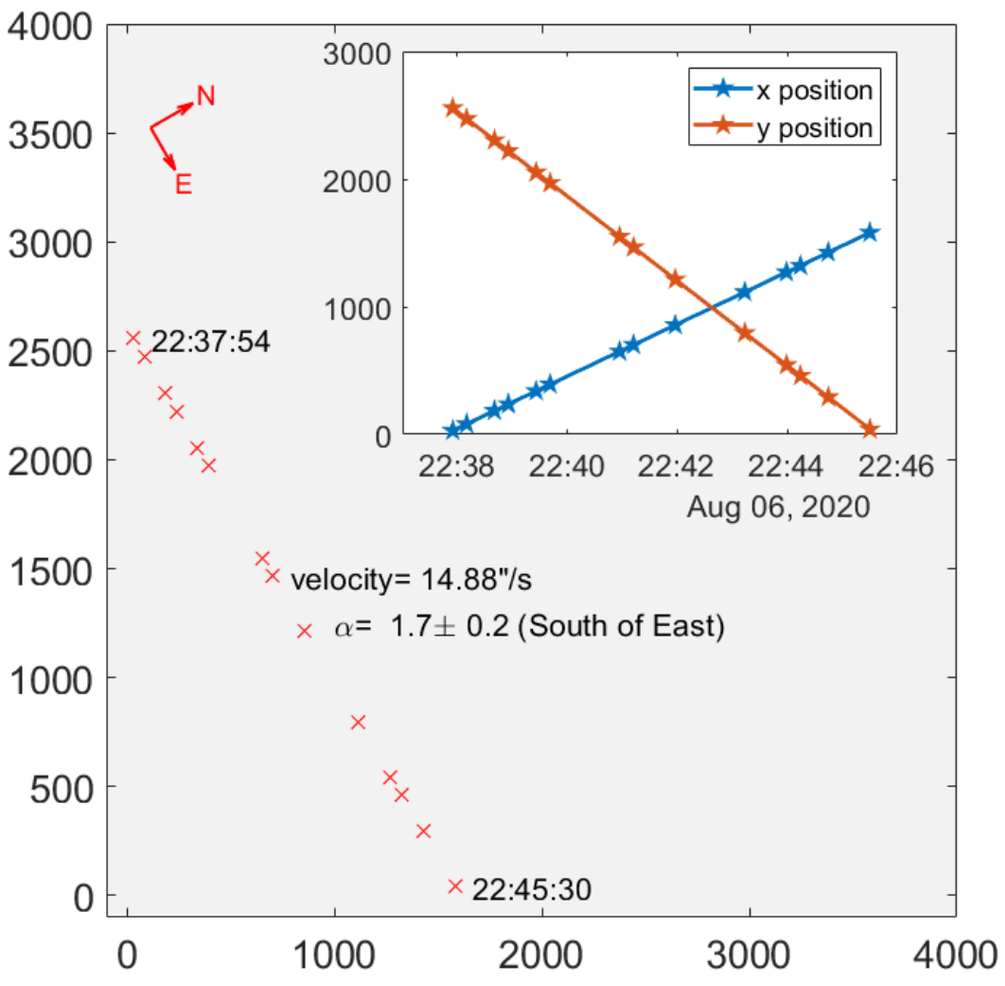

Fig 3. The trajectory of a repeating flare across the field of view. The object, moving East at 15''/s, is clearly a geosynchronous satellite.

Nature of the flares. After finding repeated flares moving in one image we can conclude these flares originate from geosynchronous/high-orbit satellites or space debris (old satellites, spent rockets, etc.).

Physical properties. Objects are tumbling with ~minute periods. The reflector size is 1-10cm diameter.

The rate of flares close to the equatorial plane (±20°) is 25-45 flares per day per deg^2.

Conclusion. Such glints can appear point-like. They are a common foreground for transient searches looking for short events (<1 exp. time), e.g., FRB/GRB counterparts.

The observatory. The *Weizmann Fast Astronomical Survey Telescope* (W-FAST) is a 55cm, f/2 telescope equipped with a fast sCMOS camera capable of taking continuous imaging of 7 deg^2 at a frame rate of 25 Hz.
Current science done at W-FAST: a search for stellar occultations by Solar System objects (Kuiper Belt or Oort Cloud objects) and studying stellar variability at short time-scales.

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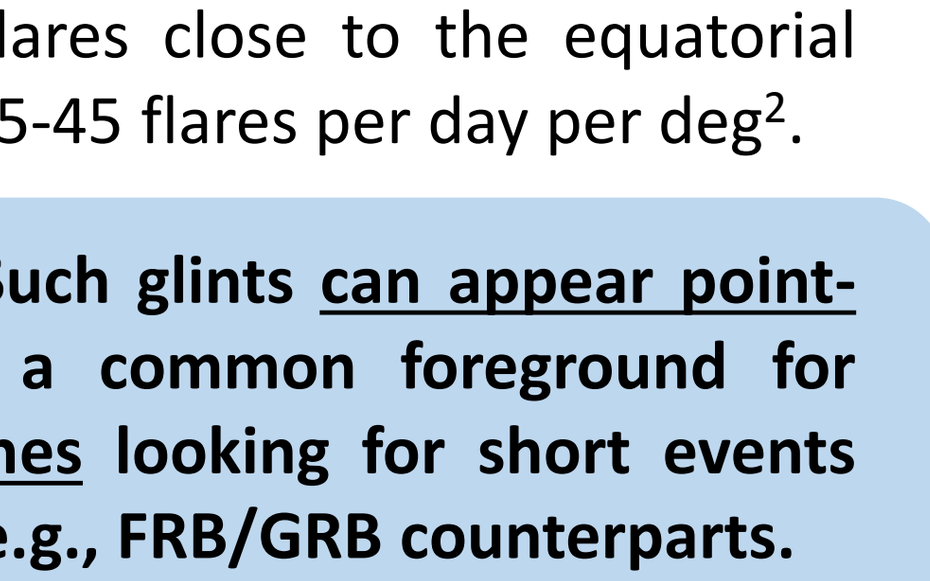
Fig 4. The W-FAST observatory in Mitzpe Ramon in the Israeli Negev.



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