24μm Latent-Image Flagging

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Preliminaries

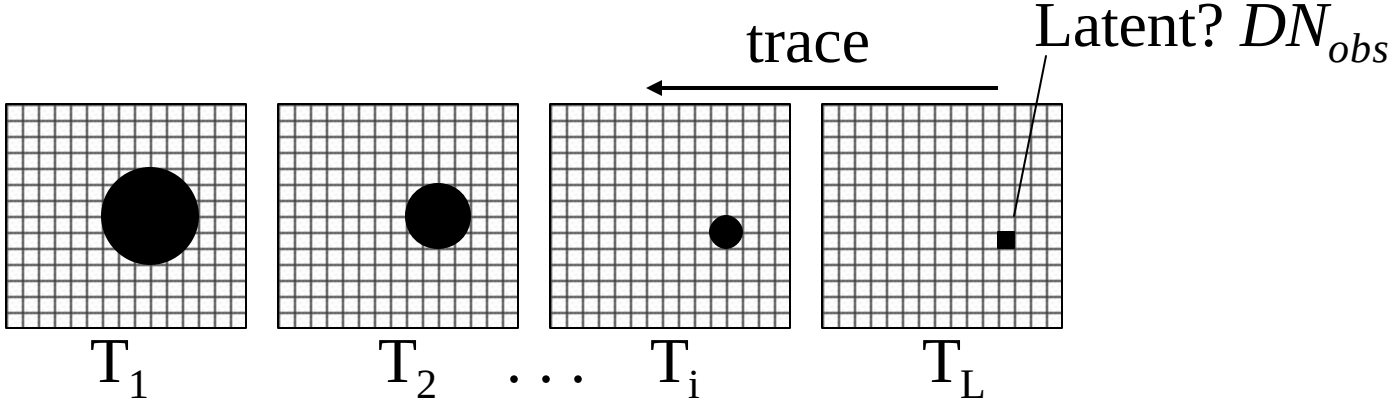
- AIM: To self-consistently flag pixels containing a latent by tracing their count level backwards in time in an ensemble of images.
- Will be performed at the post BCD level and comprise a BQD product.
- Main products:
  - Each BCD will have an accompanying 8-bit FITS image which specifies latent pixels with the value “1” and “0” otherwise.
  - A table which reports latent-pixel locations.
- Will involve ensemble processing of DCEs.

Proposed Algorithm

- Inputs:
  - Image for which latent report is requested acquired at time T_L.
  - Estimate of background level in this image s_L.
  - List of N images which precede the above image acquired at $T_i < T_L$.
  - Exposure time (T_EXP_i) for each image.
  - Latent decay model, parameterized by an analytic function, or, provided in the form of a look-up table.
- We want to determine whether a pixel in image L contains a latent,

  Latent start time: $T(start)_i = T_i + T\_EXP_i$

  Latent end time: $T(end)_L = T_L + T\_EXP_L$



Algorithm continued..

- Latent decay time from image *i* to L is given by:

$$\Delta T_i = T(end)_L - T(start)_i$$

- First, it is ensured that the target pixel in image L has a count level DN_{obs} greater than some threshold xs_L.
- We want to trace a pixel backwards in time until it contains a total count DN_i that will persist as a latent with count level $DN_{pred}(L)_i$ above the threshold in target image L:

$$DN_{pred}(L)_i > xs_L$$

- When above condition is satisfied, the pixel is flagged as a latent.
- The predicted latent intensity is from the latency model which depends on

$$DN_{pred}(L)_i = f(\mathrm{T\_EXP}_L, DN_i, \Delta T_i)$$

- The latent intensity depends on the target image exposure time, which determines the number of electron traps released.

Require from Instrument Team

- How far back in time need to go such that a latent will persist? It may only be necessary to go back one frame in the history list if the time interval is large enough.

- Require a model parameterized as an analytic function, or, a look-up table which shows the dependence of latent intensity on:

  - The initial source intensity at t = 0.
  - Time since this initial intensity was turned off.
  - Image exposure time (T_EXP) in which the resulting latent intensity was measured.

- This will also be a function of temperature. How strong is the dependence?