Colibri simulations with sim_telarray (for NECTAr)

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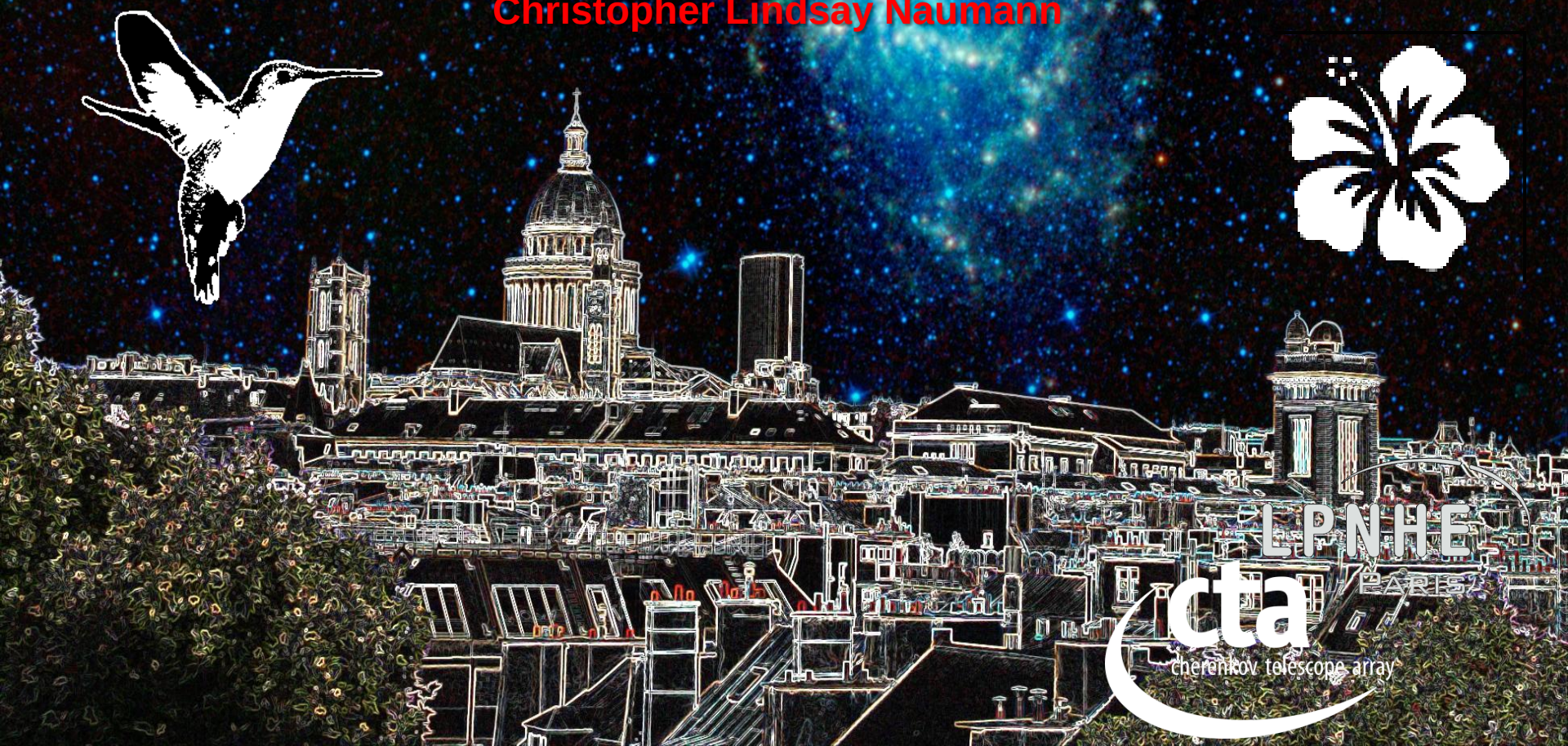
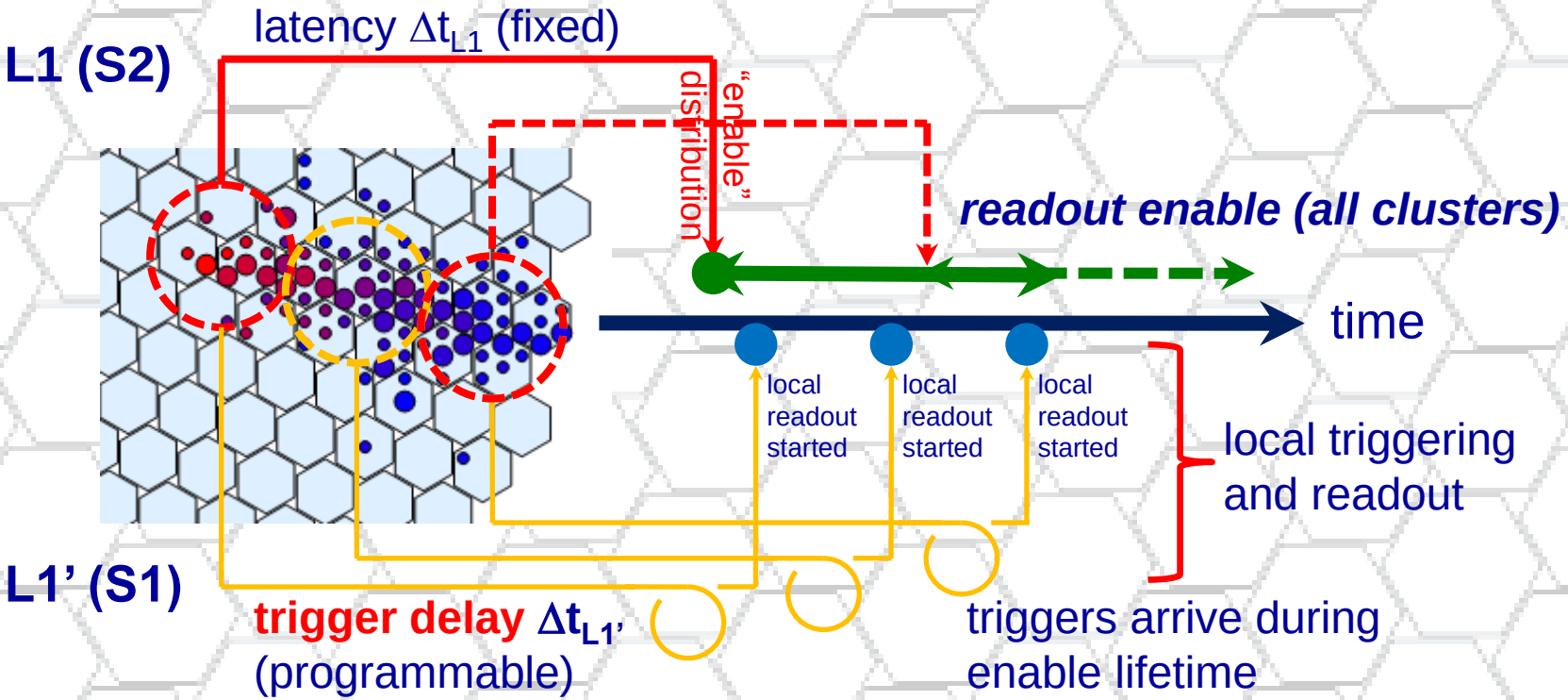


Motivation

allow colibri-style flexible triggering and readout with sim_telarray

compatible with different hardware options

include in next (mini-) production ?



Modifications to sim_telarray code

fork based on sim_telarray revision 1.81 (7/7/2011)

colibri functionality controlled by preprocessor ("#define COLIBRI")

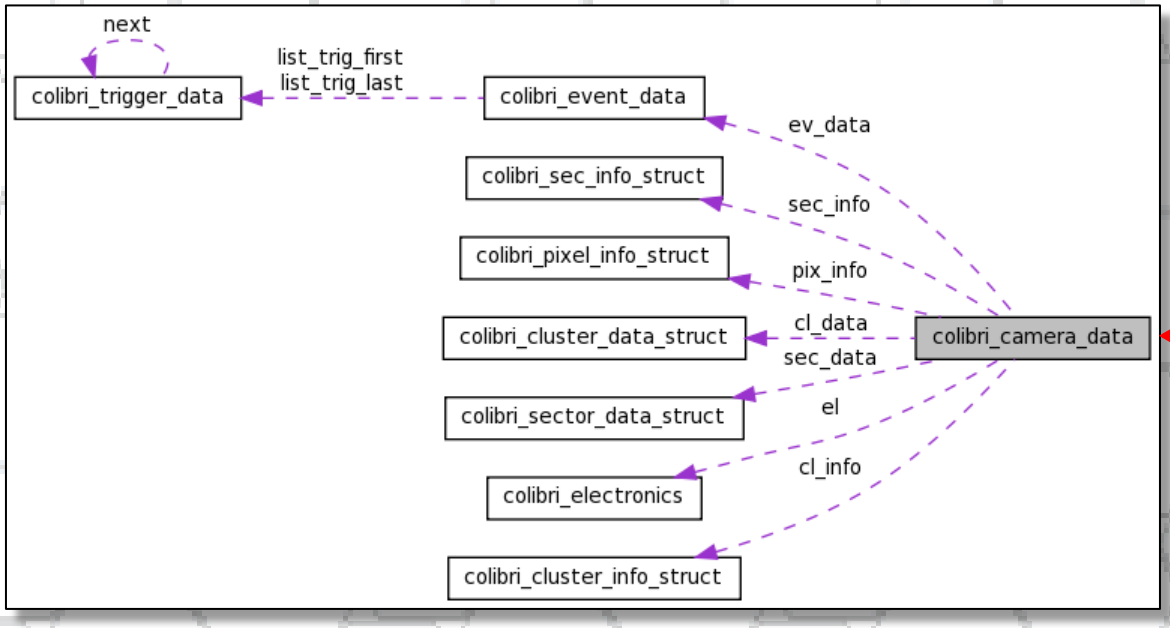
everything 100% "downwards compatible":

- all colibri-specific code encapsulated in #ifdef COLIBRI blocks
- 2-threshold triggering in file *colibri_trigger.c*, included in sim_signal.c
- data types etc defined in *colibri.h*

- perform 2-level triggering, image building
- flexible readout regions used for charge integration (*sum_adc_bins*)
- *colibri specific output included → for detailed offline analysis*

→ code available but not sufficiently tested!

colibri data in sim_telarray



one per camera and event

colibri

camera_electronics

all colibri-relevant data stored in nested structure *colibri_camera_data*, added to *camera_electronics*

- cluster and sector setup information (pixels, neighbours)
- multi-threshold trigger info (where? when? *multiple per cluster*)
- readout information: where, when, which clusters (pixels)

customisation activated by “#DEFINE COLIBRI”

Modified camera files

currently produced with Mathematica:

- based on “standard” camera files
- modified pixel setup (multiples of 7, organised in clusters)

- Colibri triggering and readout controlled via camera files:
  - cluster ←→ pixel: in “pixel” tag
  - *“ColibriClusters”*: #clusters, pixels per cluster
  - *“ClusterNb”*: cluster neighbours → readout regions!
  - *“ColibriTrigger”*: thresholds, delays
  - *“ColibriReadout”*: size of readout region, readout window length

→ the same for all cameras of this size

hardware simulation parameters

based on NECTAr design, with Spanish trigger boards

points to discuss and fix:

• what pixel trigger threshold?	*3.5pe → get from NSB sim!*
• what cluster thresholds (S1/S2)?	*2 / 4 pixels per 21 / 28 ?*
• realistic pulse shape and length?	*custom wf, 2.6ns FWHM*
• what range to read out?	*R=1 (next neighbours)*
• readout window length?	16 ns ?
• enable length and offset?	100 ns ?

- *what kind of array ?*

Conclusions

Colibri triggering and readout available for sim_telarray

- possible to include in WP-MC array simulations?
- modified code being tested on mini-production (with help from Nukri!)
- could get “semi-official” version sometime soon
- **NEED REALISTIC HARDWARE PARAMETERS!!!**

possible to do for all camera sizes, different readout windows, triggering schemes, thresholds

currently only *analogue majority trigger*... but could include also others!

Questions ? ask me!

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