

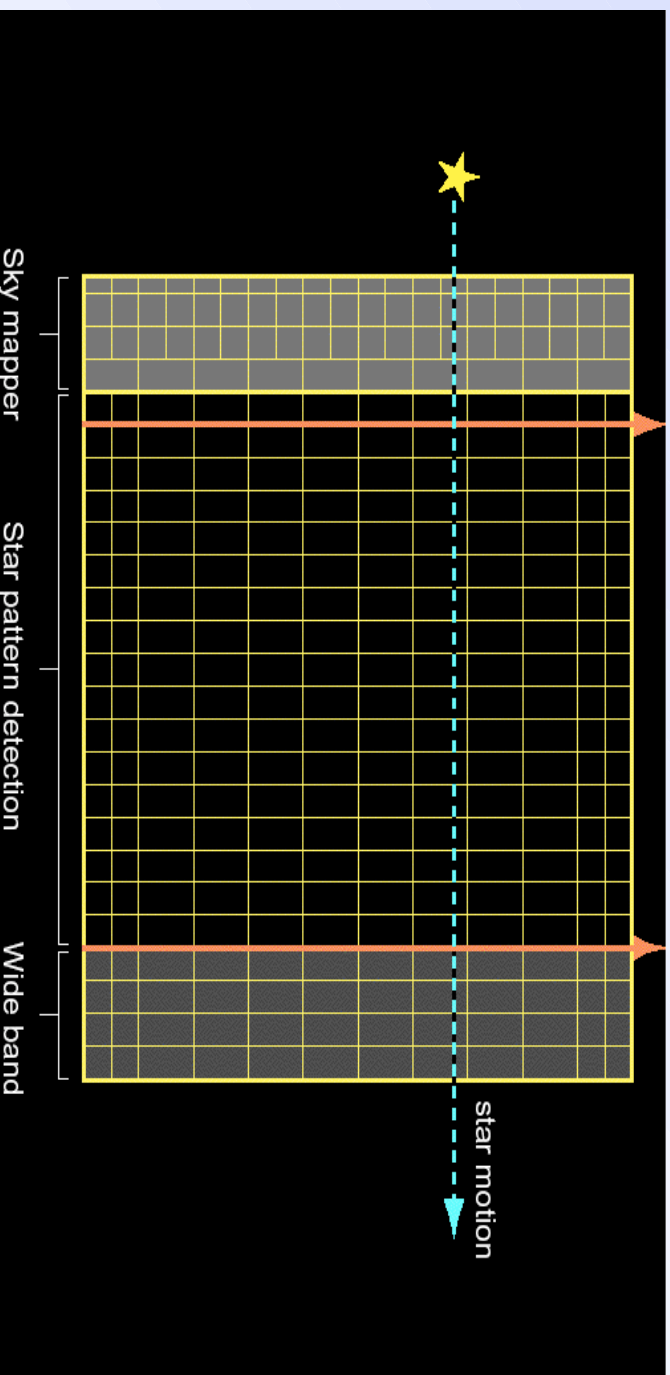
Plan

- General presentation
 - The focal plane
 - Requirements for detection and selection
- Needs for the PDHE
- Simulations
 - Overview of processing in GIBIS
 - Interface with PDHE study



Many ways to describe the astro focal plane

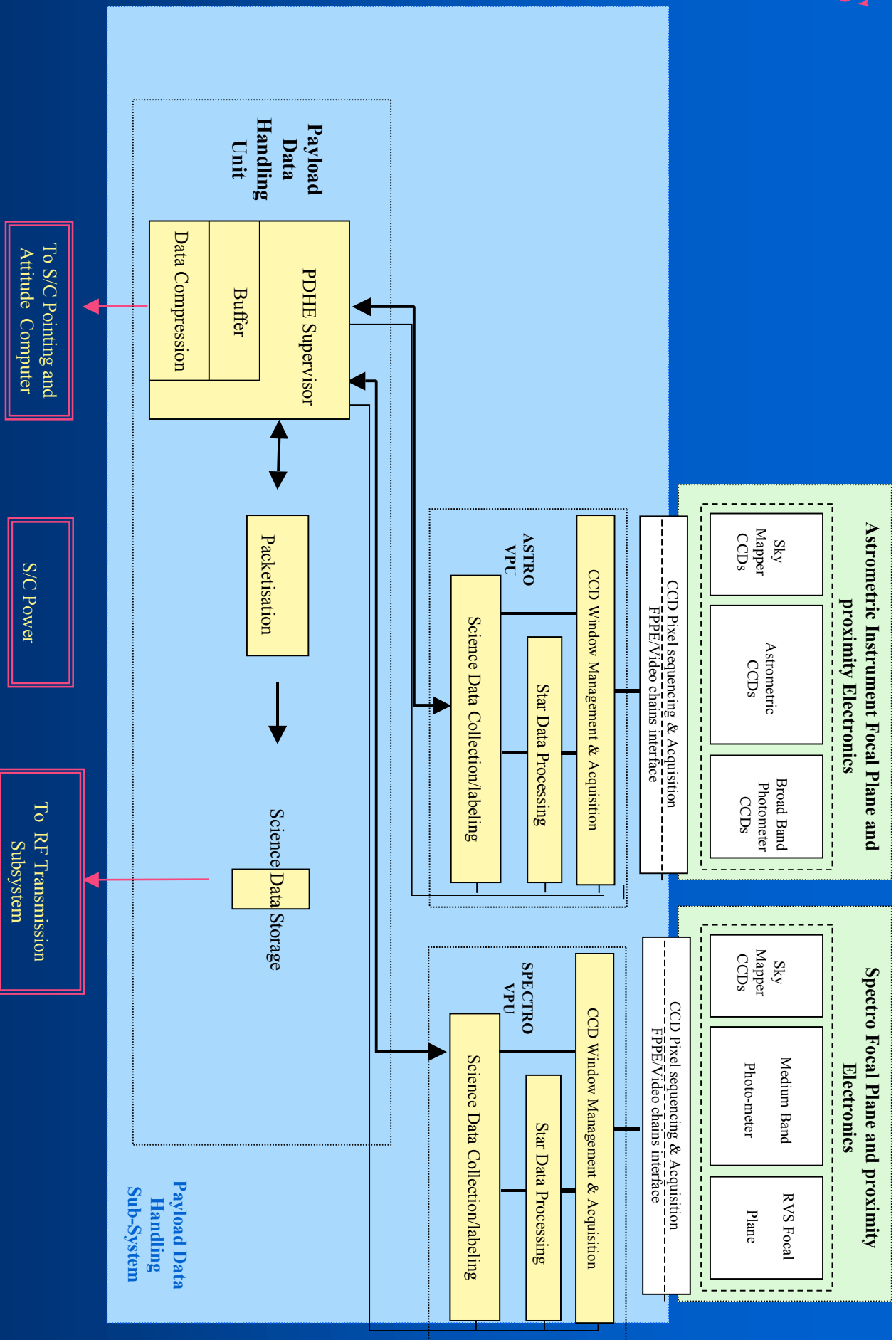
- Science (function): ASM (detection) AF (astrometry) BBP (photometry)
- Reading (algo+elect.): ASMO/1 (all read) ASM3+AF+BBP (selected)
- Sampling (electronics): ASM (2x2) AF01-16 (6x8) AF17 BBP
- Patches (telemetry): - all differents ! -
- Activation: ASM2(redundancy) all others



ASMO 1 2 3

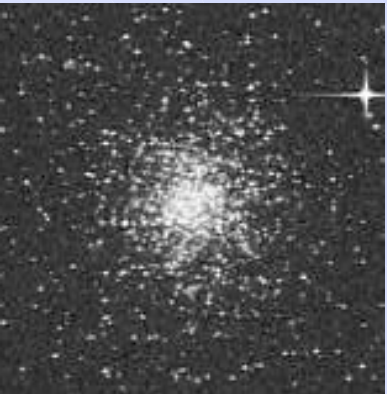
AF01-16

17 BBP1-4

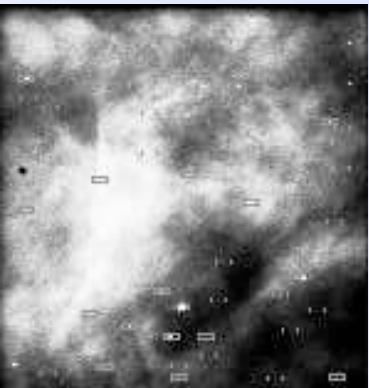


From W. Gasti
Radial Velocity Spectrometer
Workshop, 1/2 October, 2001

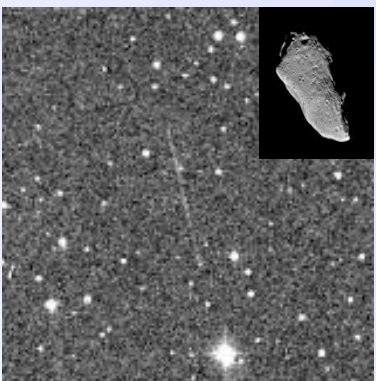
Various objects



Globular cluster



High background



Near-Earth Objects

- Stars
 - High density
- NEO
 - Motion during integration
- Galaxies
 - Large area

On-Board Detection

- 2 algorithms studied (APM, SWA)

- PDHE study

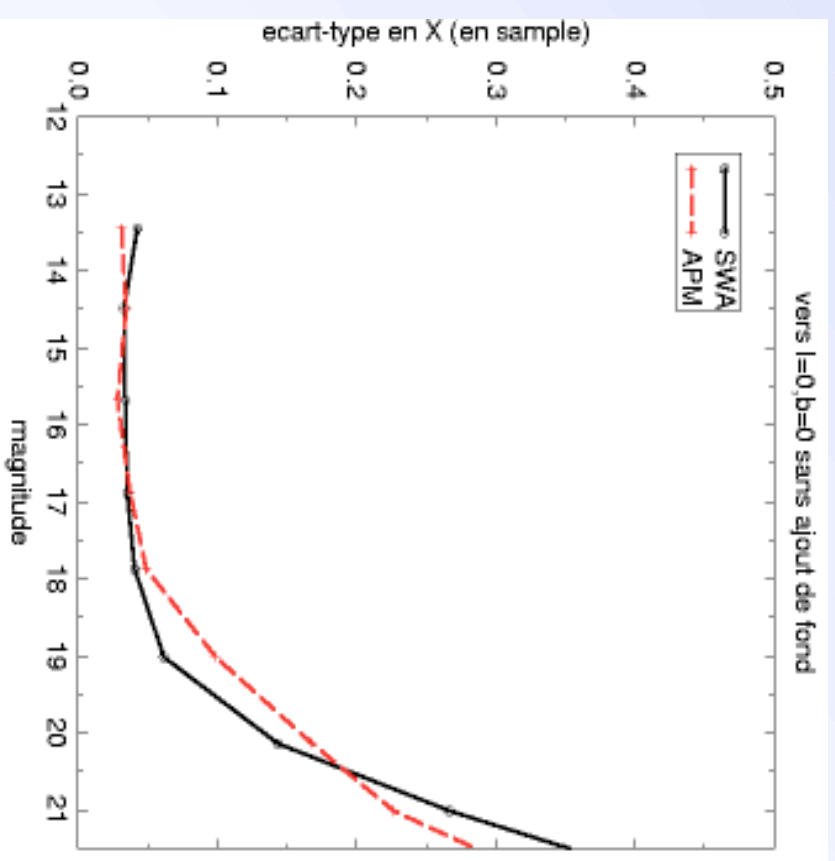
- 🔗 Needed ressources (CPU + memory)

- 🔗 C code needed

Based on:

- 🔗 OBD-CoCo-01 Work reference document

- 🔗 OBD-CoCo-02 Provisional software development



Detection - I: Basic outputs

- Sky background estimation (local, global)
- Pre-processing (filtering)
- Source search (peak or pixel connectivity)
- Detection validation (SNR)
- Parameter estimation (position, flux, shape)
- Classification (point-like, extended, binary)
- Scan rate computation

Detection - II: Requirements

- **Completeness**
 - > 20^m (ASM+SSM)
 - > 21^m for special objects (NEO/QSO/BD)
 - Galaxies and nebulae?
- **False detections**
 - No confirmation in SSM: higher SNR threshold level
 - Cosmic ray detection
- **Precision**
 - Good enough for object tracking
 - For scan rate
- **Classification**
- **Processing: fast <2s (ASM), <3s (SSM), robust**

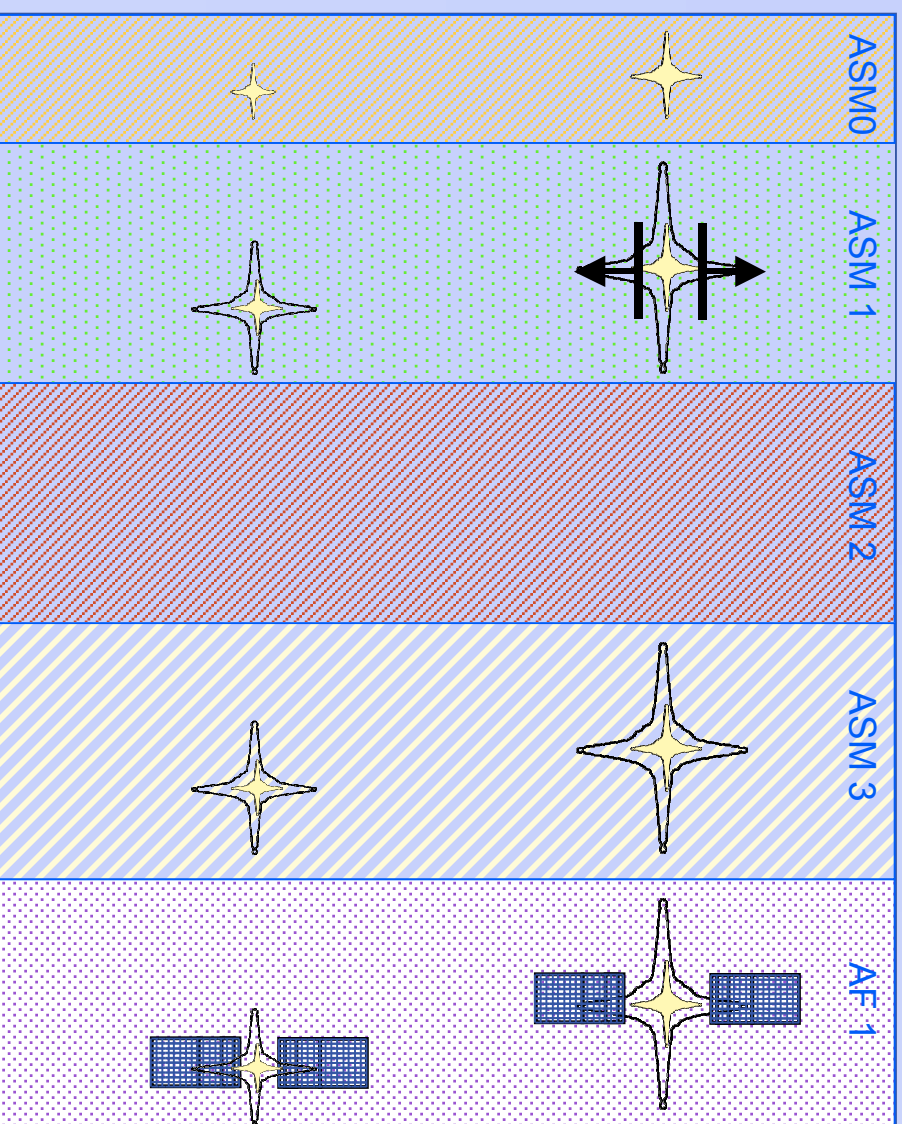
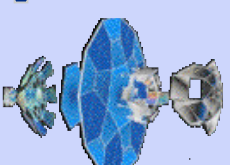
Selection - I: Why and how

- **After detection:**
 - Which objects to observe
 - How (centring, size, overlapping, ...) in each CCD (tracking=observing strategy)
 - What to download
- **Constraints on resources**
 - Patches (limited number of)
 - Storage (possible downlink failure)
 - Telemetry (some great circles)
- **For each object: a priority code**
 - Can be as simple as magnitude
 - May depend on shape, field density, position...

Selection - II: Requirements

- Selection reproducible on ground (scientific censorship)
- On-board processing and transmission
 - No overlapping of samples
 - Limited number of patches
 - Lag between arriving objects
 - Limited on-board memory
 - Limited telemetry
- Observing strategy
 - Crowded fields, double stars, galaxies, NEO: TBD (e.g. GAIA-CUO-100)

Bright stars



**The same definition
for all windows**

**The space between
windows is
determined by the
comparison
between ASM0
and ASM1**

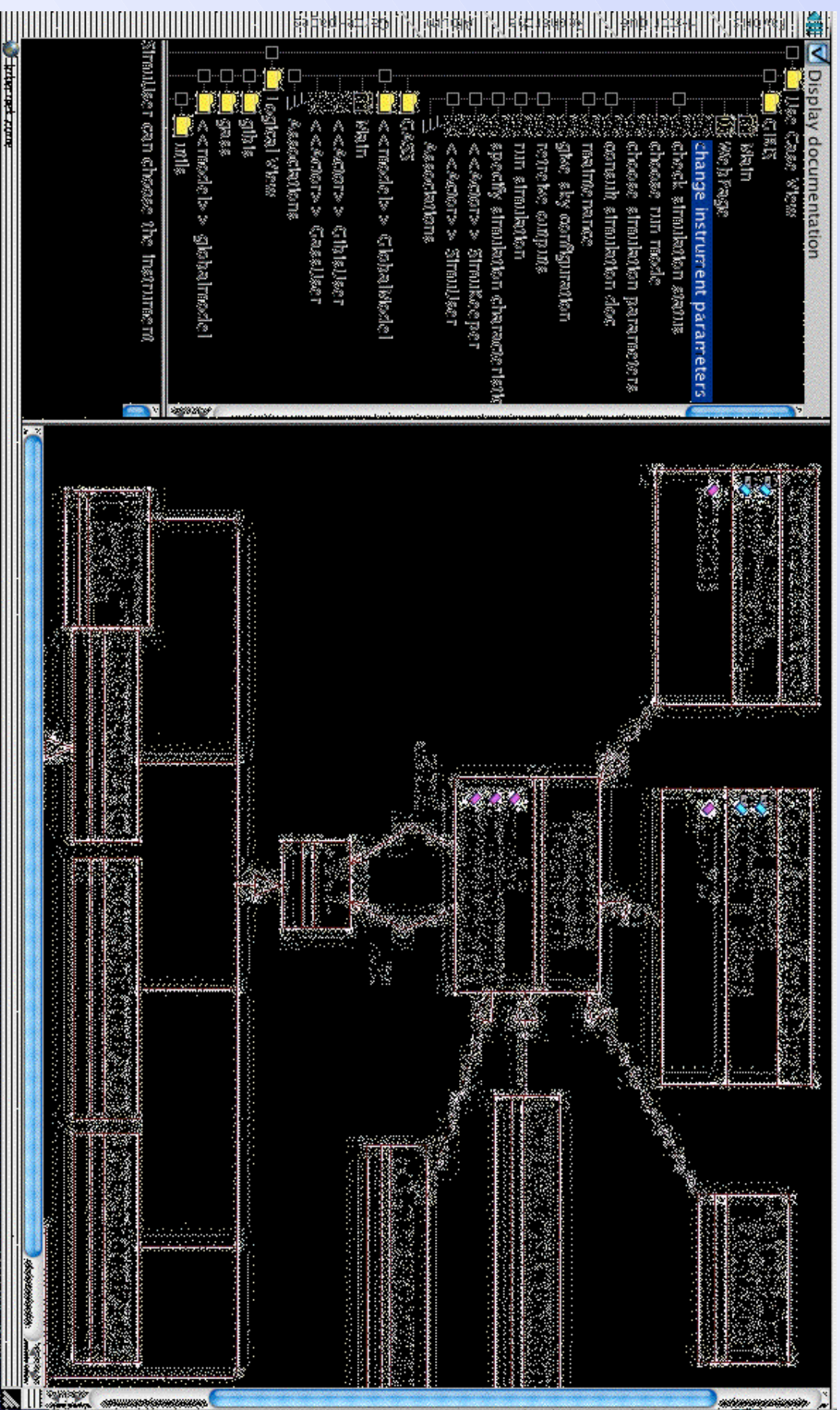
**No saturated samples
are downloaded**

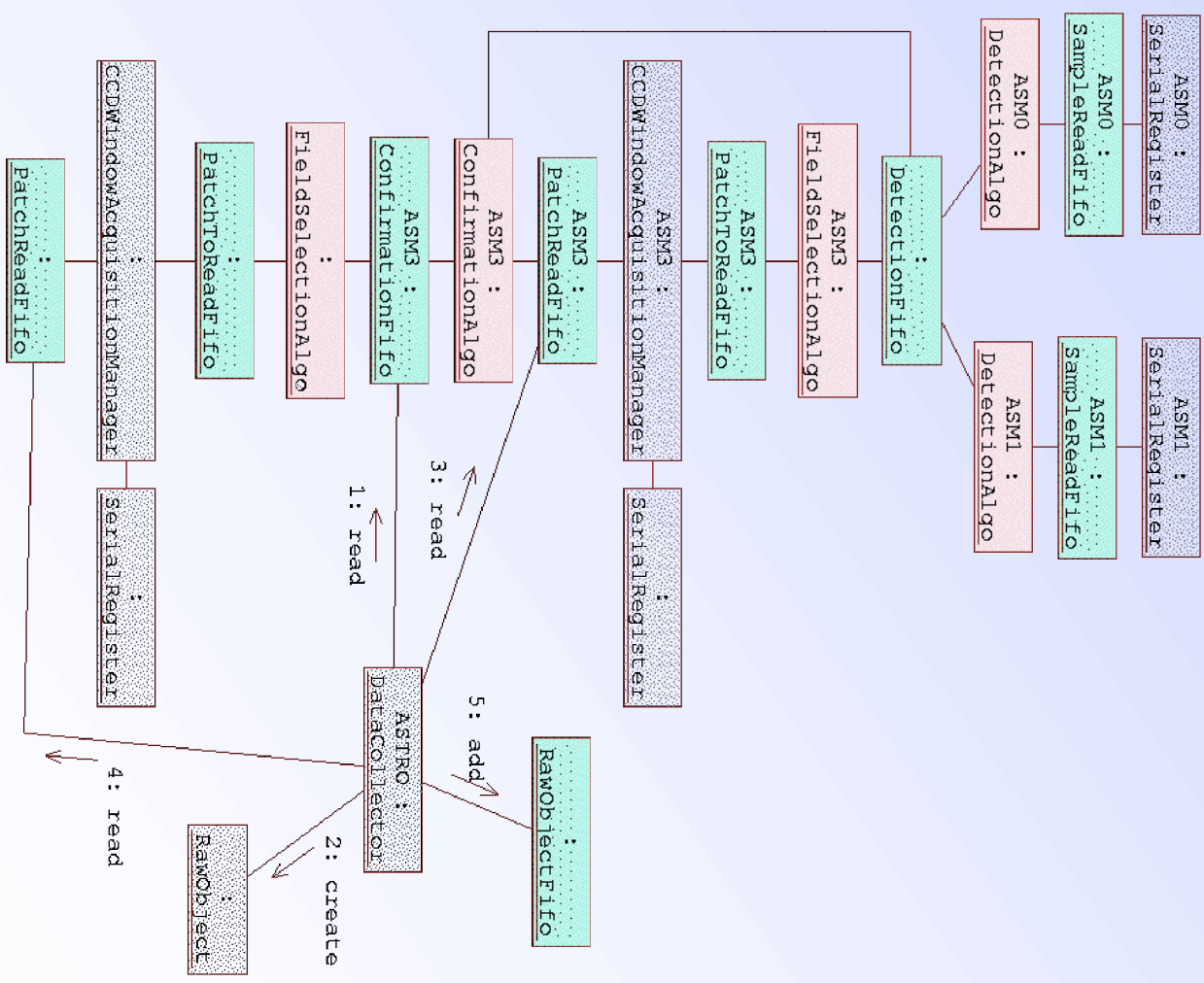
GAIA-CUO-100,
AAEB-FACB-01
GAIA-BCN-JP-001

Simulations needed

- All sources
 - stars, binaries, galaxies, solar system objects
 - mean statistical distributions of the parameters
 - extreme cases
- Sky configurations
 - crowding
 - high background variations
- Instrument
 - precise PSF estimation
 - cosmic rays
 - CTE degradation

Rose model





PDHS demonstrator

