Euso Detector Simulation

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Detector Simulation

- We have started to develop a fast simulation for the Euso detector
  - **Improve physic studies**
    - Compute energy threshold and efficiency of Euso
    - Detector response to different event categories

  - **Optimize the design of detector elements**
    - Focal plane geometry and optical adaptors
    - Micro-cell and Macro-cell layouts
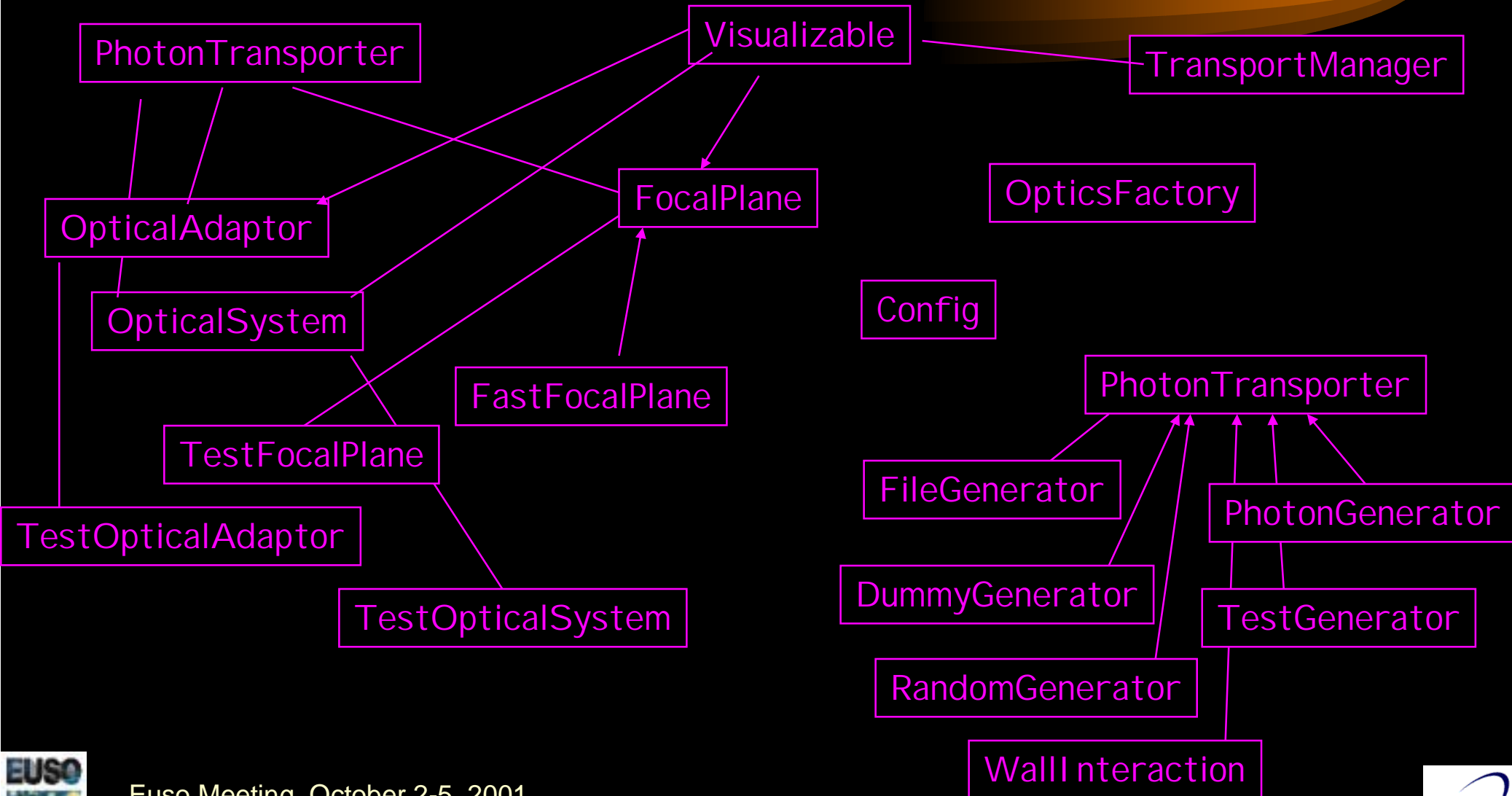   - Front end electronics and Trigger logic
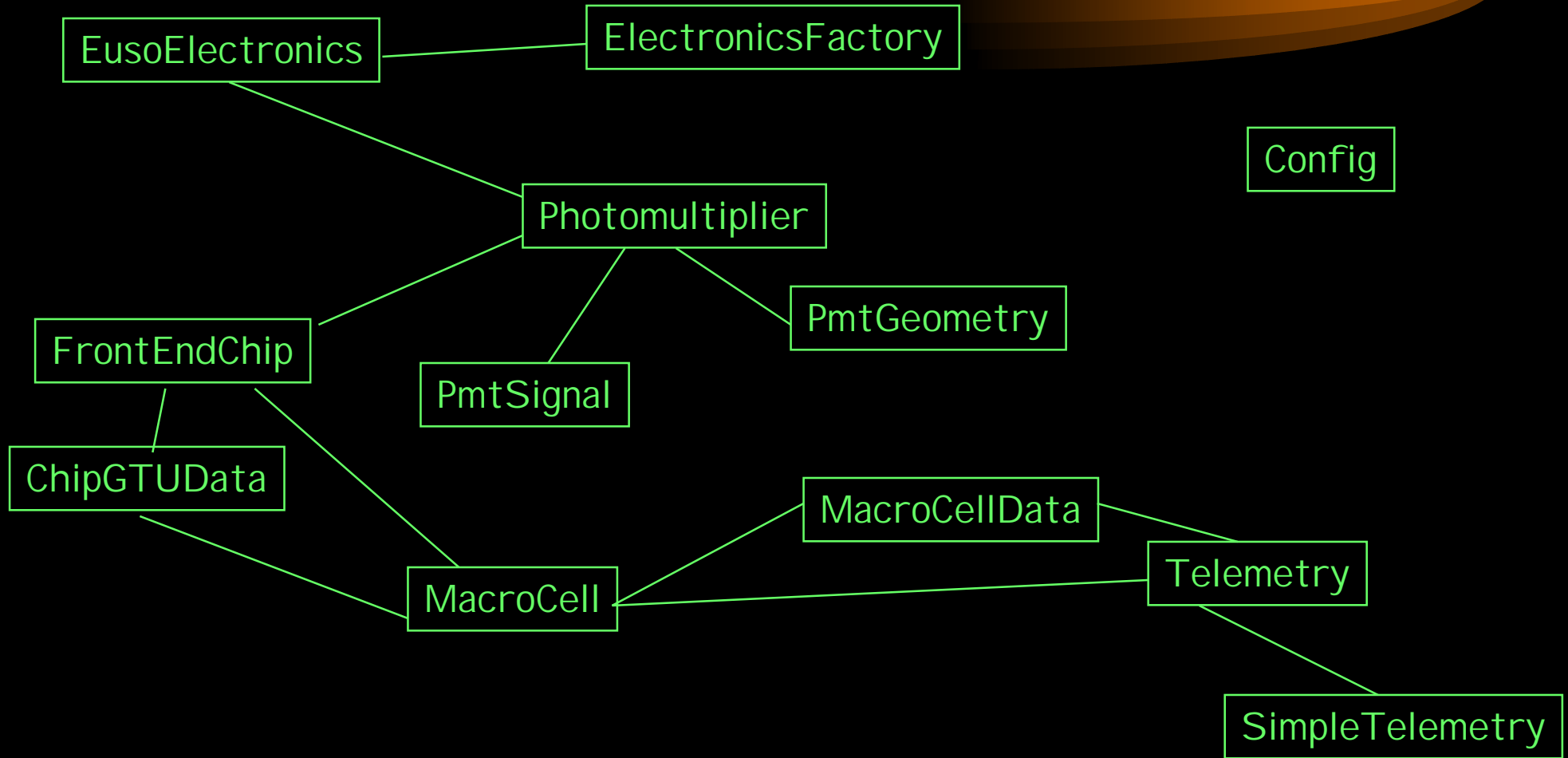
Detector simulation (II)

- Main features
  - Modular
    - The **input is a list of photons** entering the detector (direction, position in the pupil, time and frequency)
      - easy to interface to EAS simulator and atmosphere transport simulator programs
    - The output is the data arriving on earth (eventually in the very same format of the real data)
  - C++ Object Oriented
    - Many possible design options easy to compare
    - **Based on 'root' package.** A lot of features (graphics, analysis, data storage) readily available

Program structure: optics

Program structure: pmts/electronics

EusoElectronics — ElectronicsFactory

Config

Photomultiplier

PmtGeometry

FrontEndChip

PmtSignal

ChipGTUData

MacroCellData

MacroCell

Telemetry

SimpleTelemetry
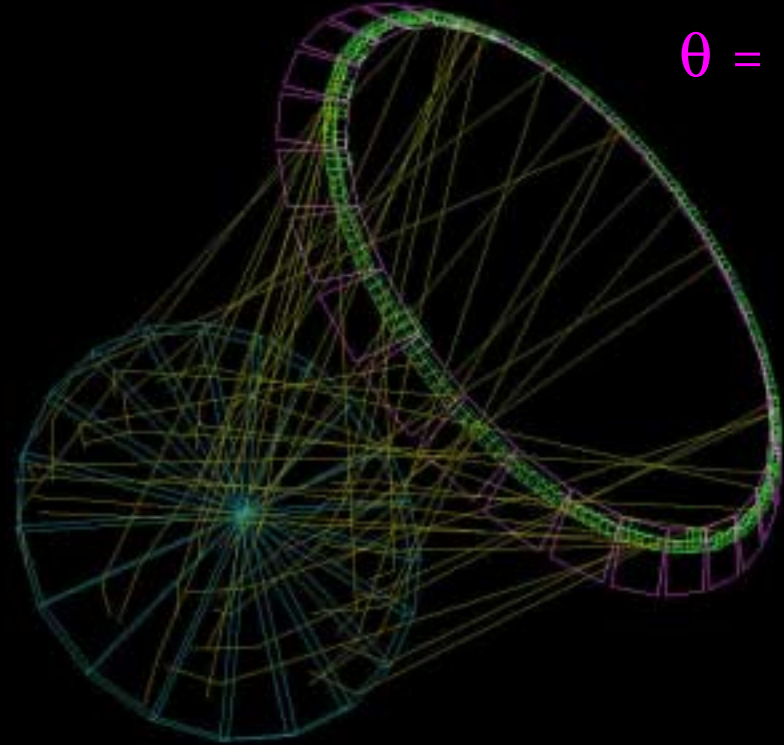
Project status

- The program at the end will:
  - Simulate the optics response parametrically (need real PSF!)
  - Transport photons to light detectors
  - Simulate PMT, electronics and trigger response

- Status
  - Simple photon transporter done
  - PMT simulations done
  - Front end simulations 50% done
  - Trigger simulation to be done

A few pictures

focal surface

optics
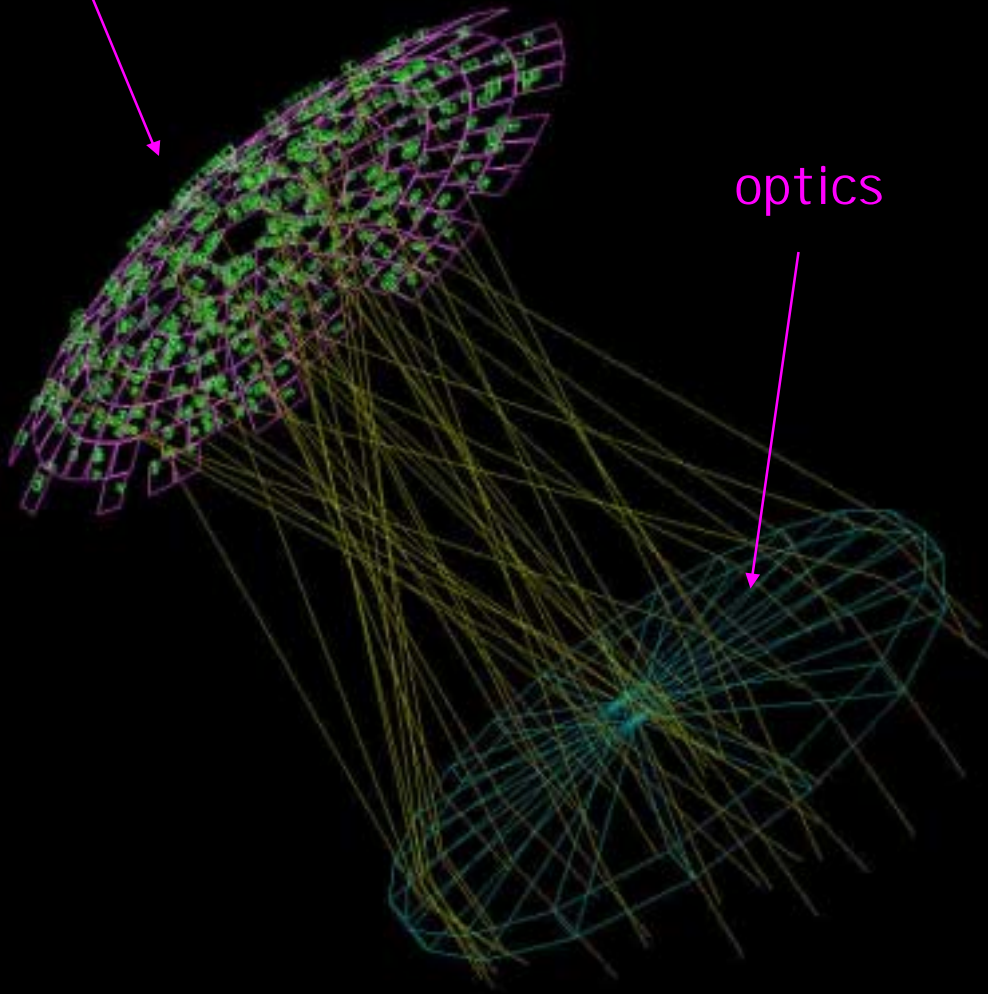
θ = const

Conclusions

- A fast detector simulation program is under development in Genova

- It is a modular OO design in C++ based on 'root'

- It will be available by the end of this year via CVS to all interested

- Its design is meant to be flexible enough to accomodate different level of simulation accuracy (fast and or 'full' simulation)

- We need input for optics simulation!

EUSO

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