Monte Carlo Production
for the MAGIC telescope
A generic application of EGEE
Towards the MAGIC Grid

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In cooperation with the MAGIC collaboration

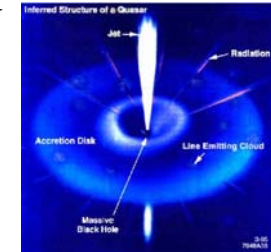In cooperation with the EGEE project

What kind of MAGIC?

Physics Goals: Origin of VHE γ–rays
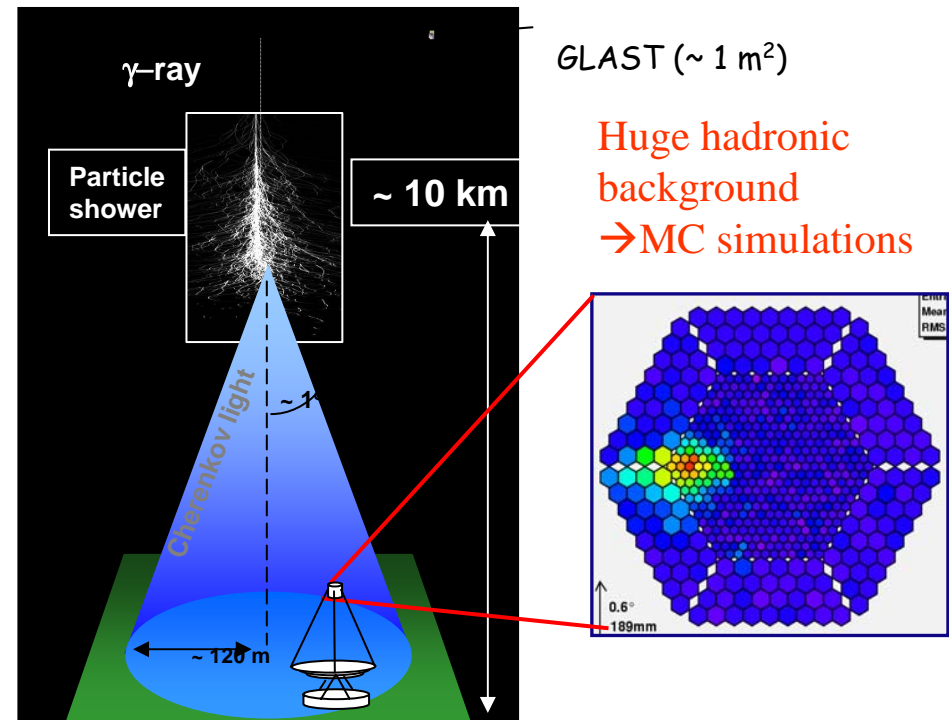
Gamma ray: 30 GeV - TeV
- Active Galactic Nuclei (AGN)
- Supernova Remnants
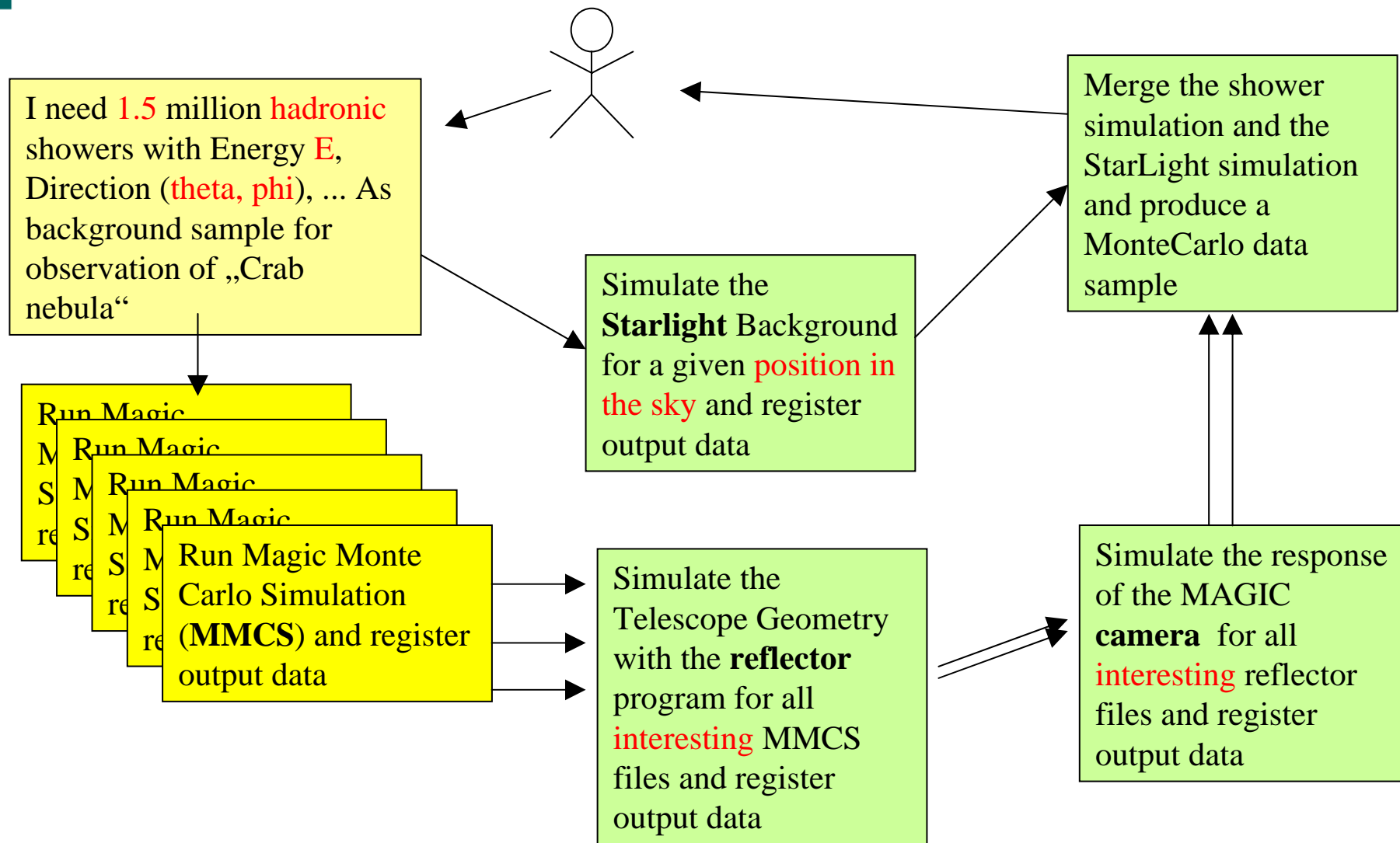- Unidentified EGRET sources
- Gamma Ray Burst

MAGIC collaboration:
- International (21 partners)
- main partners in Italy, Spain and Germany
- still a small collaboration

IFAE Barcelona, UAB Barcelona, Humboldt U. Berlin, UC Davis, U. Lodz, UC Madrid, MPI München, INFN / U. Padova, INFN / U. Pisa, U. Potchefstrom, INFN / U. Siena, Tuorla Observatory, INFN / U. Udine, U. Würzburg, Yerevan Physics Inst., ETH Zürich

γ–ray

Particle shower

~ 10 km

GLAST (~ 1 m²)

Huge hadronic background
→MC simulations

Cherenkov light

~1°

~ 120 m

0.6°
189mm

MAGIC Grid – MC Workflow

I need 1.5 million hadronic showers with Energy E, Direction (theta, phi), ... As background sample for observation of „Crab nebula"

Run Magic Monte Carlo Simulation (**MMCS**) and register output data

Simulate the **Starlight** Background for a given position in the sky and register output data

Merge the shower simulation and the StarLight simulation and produce a MonteCarlo data sample

Simulate the Telescope Geometry with the **reflector** program for all interesting MMCS files and register output data

Simulate the response of the MAGIC **camera** for all interesting reflector files and register output data
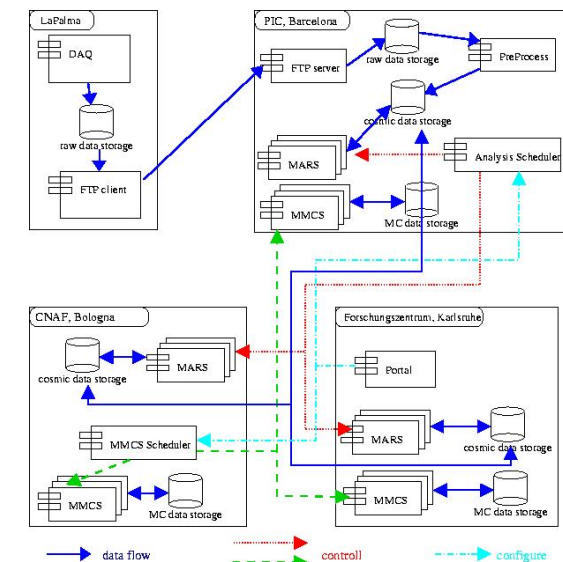
MAGIC Grid – the idea

- A lot of MC simulation needed to reduce the hadronic background to got scientific results at low energies
  - to simulate the background of one night, 70 CPUs (P4 2GHz) needs to run 19200 days

- Observation data are big too!!
  - Requirement: Easy accessible at different sites
  - MAGIC telescope II will start 2007 (scalability)

→ **MAGIC Grid:**
  - Use the three national Grid centers as a backbone
    - All are members of EGEE
  - Connect MAGIC resources to enable collaboration
  - (Get resources for free! ☺)

- MAGIC MC simulation was accepted as Generic application by EGAAP

MAGIC Grid – the reality

Good ☺ :

- MAGIC VO in operation
- MAGIC Grid consists of (>) 21 sites
- MAGIC Grid is operational
    - GGUS User
- MC Data are stored at PIC
    - Sustainability is given
- Training performed
    - First Magicans become adicted by the EGEE Grid
    - They want more training!

Good ☺:

- Three data challenges:
    - Mar/Apr 2005: 10% failure
    - July 2005: 3.9%failure
    - Sept 2005: 3.4% failure
    - Improvements:
        - Underlying Middleware
        - Operation of Services
- A lot of material available!

MAGIC Grid – the reality II

Issues:

- Communication in a complex environment
  - One spents a lot of time to find the right person
  - Many board to participate
  - Account Manager for generic VOs not available!
- Installation of MW stack
  - Still a complex enterprise
- Integration of new sites
  - \# of supported OS = 1
  - Installation is complex
  - Integration of small sites not effective

Issues:

- Uncertainty about the MW
  - LCG-2.Y vs gLite-1.Y?
    - What will be the MW of LCG?
  - What is about GT4? WSRF?
- Interoperability
  - Virtual obervatories are not based on EGEE MW
  - Workflows?
- Data sustainability
  - Do I need a „non-Grid" copy of my data?
- TCO of the MAGIC Grid
  - When will the bill arrive?

MAGIC Grid – future prospects

- MAGIC Grid is reality

- Start with production of MC using MAGIC Grid resources soon!
  - We plan to ask (temporarily) for more CPU!

- MAGIC collaboration built a task-force to evaluate Grid as the backbone for MAGIC II
  - 2 telescopes with a new DAQ system with faster FADCs
  - MC and real data!

- MAGIC is a good example
  - to do e-Science
  - to use the e-Infrastructure
  - to exploit Grid-Technology

  „Towards a virtual observatory for VHE γ-rays"

  proceeding for Cherenkov 2005

MAGIC/EU

Kangaroo - AUS/JP

Veritas/US

HESS/Africa

Notizen

- Middleware limited to one OS system dialect

- Installation still a big use, no out of the box

- Data accessibility, data provisioning, etc. (Still scientists want to know where the data are

- What is the right MW to chose?

- Is EGEE the right track? What is about GT4? What is about Interoperability?