

ASTROFÍSICA DE ALTAS ENERGIAS

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O PROJETO protoMIRAX

O protoMIRAX

Simulações em Geant4

RESULTADOS

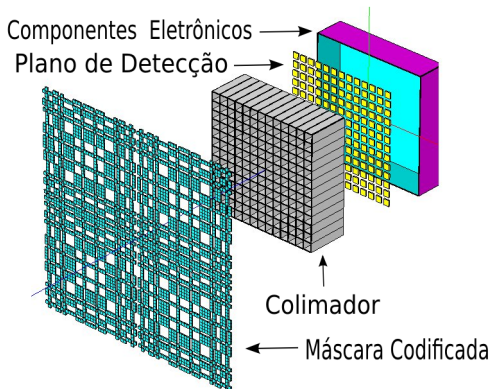
PERSPECTIVAS

MIRAX

Redução de dados



O protoMIRAX





Geant 4

O que é ...

- Plataforma de simulação → Passagem de partículas através da matéria.
- Programação orientada a objetos.
- Aplicações:
 - Física do espaço.
 - Física de altas energias.
 - Física nuclear.
 - Física médica.



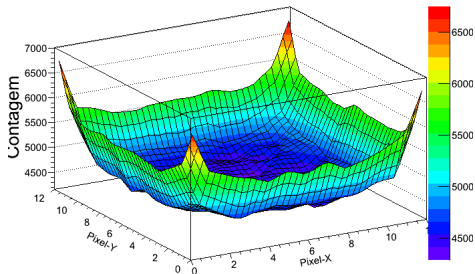
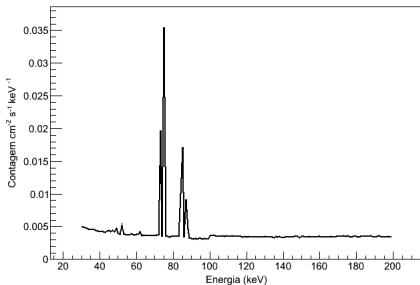
Implementando uma simulação ...

- Geometria.
- Processos de interação e partículas.
- Geração de eventos primários.



Resultados

Espectro



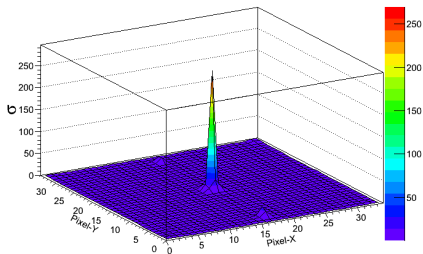


Figura: Padrão MURA 37×37 .

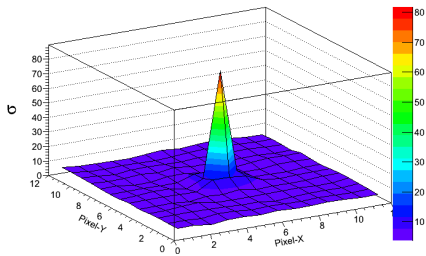
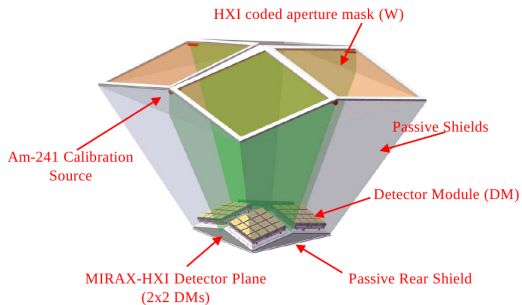


Figura: Padrão MURA 13×13 .



MIRAX





SPENVIS

SPace ENVIRONMENT Information System

SPENVIS

NAVIGATION

- Home
- Access
- Register
- About SPENVIS
- Documentation
- Credits
- Rules of conduct
- My account
- Forums
- Bug tracker
- Lost password

SPENVIS
The Space Environment Information System

esa

With SPENVIS, one can generate a spacecraft trajectory or a coordinate grid and then calculate:

- geomagnetic coordinates
- trapped proton and electron fluxes and solar proton fluences
- radiation doses (ionising and non-ionising) for simple geometries
- a sectoring analysis for dose calculations in more complex geometries
- damage equivalent fluences for Si, GaAs and multi-junction solar cells
- Geant4 Monte Carlo analysis for doses and pulse height rates in planar and spherical shields
- ion LET and flux spectra and single event upset rates
- trapped proton flux anisotropy
- atmospheric and ionospheric densities and temperatures
- atomic oxygen erosion depths

Magnetic field line tracing is implemented, as well as the generation of world maps and altitude dependence plots of the magnetic field and the current models of the neutral atmosphere and the ionosphere.

Models for spacecraft charging, both surface charging and internal charging, are available.

A tool to visualise satellite data produces panel plots of measured quantities in combination with geomagnetic and solar indices.

Micrometeoroid and space debris models are implemented, and an impact risk analysis module is currently under development.

SPENVIS Screen captures

Suppliers
Belgian Federal Science Policy

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Figura: <http://www.spENVIS.oma.be/intro.php>



Processamento com MPI

```

G4MPI(EventProc) [/]:
G4MPI(EventProc) [/]:/mpi/status
* rank= 0 run= 0 event= 6321 / 12500 state= EventProc time= 31.78s
* rank= 1 run= 0 event= 6711 / 12500 state= EventProc time= 33.76s
* rank= 2 run= 0 event= 6484 / 12500 state= EventProc time= 33.64s
* rank= 3 run= 0 event= 7291 / 12500 state= EventProc time= 33.54s
* rank= 4 run= 0 event= 6781 / 12500 state= EventProc time= 33.76s
* rank= 5 run= 0 event= 6958 / 12500 state= EventProc time= 34.75s
* rank= 6 run= 0 event= 6261 / 12500 state= EventProc time= 32.28s
* rank= 7 run= 0 event= 6542 / 12500 state= EventProc time= 31.91s
-----
* #ranks= 8 event= 53349/100000 state= Run time= 265.42s
G4MPI(EventProc) [/]:
  
```

```

castro@alienware:~/fg4work/parallel/MPI/exMPI02
File Edit View Search Terminal Help

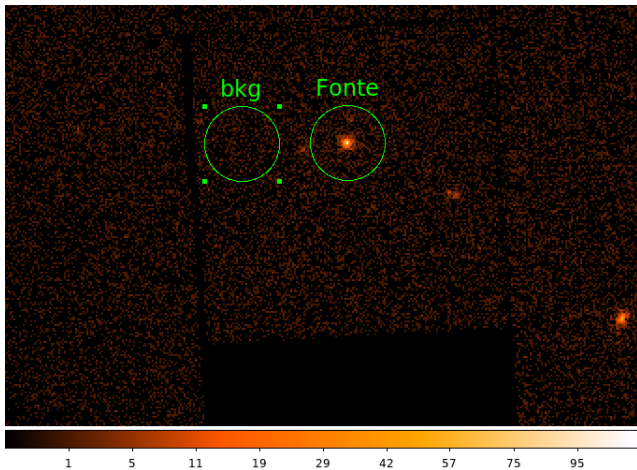
 1 [||||| 100.0%] Tasks: 130, 323 thr: 9 running
 2 [||||| 100.0%] Load average: 5.28 2.29 1.00
 3 [||||| 100.0%] Uptime: 07:59:45
 4 [||||| 100.0%]
 5 [||||| 100.0%]
 6 [||||| 100.0%]
 7 [||||| 100.0%]
 8 [||||| 100.0%]
Mem[||||| 3256/16033MB]
Swp[||||| 0/18095MB]

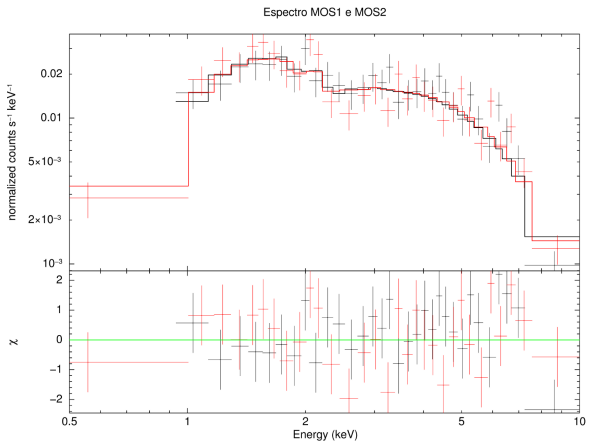
  PID USER  PRI  NI  VIRT  RES  SHR  S  CPU%  MEM%  TIME+  Command
15584 castro 20  0  539M 72280 31452 S 100.0 0.4 0:54.91 exMPI02
15583 castro 20  0  539M 74652 31364 S 101.0 0.5 0:54.09 exMPI02
15585 castro 20  0  539M 72320 31320 S 96.0 0.4 0:54.73 exMPI02
15596 castro 20  0  539M 72280 31452 R 98.0 0.4 0:53.18 exMPI02
15581 castro 20  0  539M 72336 31412 S 101.0 0.4 0:54.32 exMPI02
15595 castro 20  0  539M 74652 31364 R 99.0 0.5 0:52.41 exMPI02
15598 castro 20  0  539M 72320 31320 R 94.0 0.4 0:53.00 exMPI02
15586 castro 20  0  539M 73580 31376 S 95.0 0.4 0:52.82 exMPI02
15594 castro 20  0  539M 72336 31412 R 99.0 0.4 0:52.67 exMPI02
15601 castro 20  0  539M 75060 31756 R 99.0 0.5 0:50.93 exMPI02
F1 Help F2 Setup F3 Search F4 Invert F5 Tree F6 SortBy F7 Nice F8 Nice + F9 Kill F10 Quit
  
```

Redução de dados

2XMM J174016.0-290337

Farrell et al. 2010, A&A, 523, A50







Fontes alvo

- 1E 1740.7-2942.
- GRS 1758-258.