R3B simulations - Status

R3BSim (USC – Daresbury)

• Developed by a Simulation WG, from the beginning of the R3B collaboration

• http://fpsalmon.usc.es/r3b/simulationIndex.shtml

R3BROOT (GSI)

• recent development (Denis Bertini)

• based on FAIRROOT (like CBMROOT and PANDAROOT)

R3BSim

GEANT4 based + ROOT

Includes:

- Calorimeter (2 geometries)
- Si tracker (2 geometries)
- Also Aladin, land, tof, DCh

- compatibility with the event generator (p,2p) - Leonid Chulkov

- initial analysis code exists

R3BROOT

ROOT based + GEANT4&3 + FLUKA (= Virtual Monte Carlo code)

Includes:

- Calorimeter (2 geometries)
- Si tracker (only 1 geometry)
- Also Aladin, land, tof, Dch

- No compatible yet with the event generator (p,2p)

- No analysis code
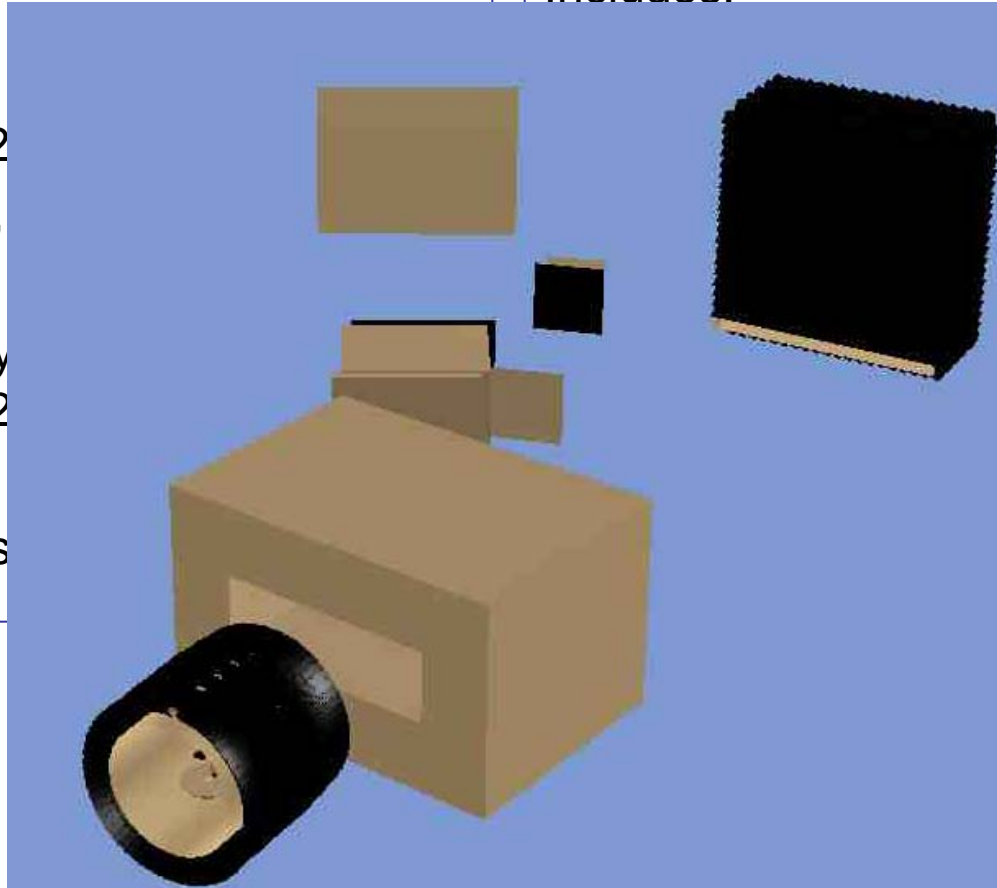
• Both maintained using the subversion application (svn)

R3BSim

R3BROOT

GEANT4 based + ROOT

ROOT based + GEANT4&3 + FLUKA
(= Virtual Monte Carlo code)

Includes:

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<u>Includes:</u>

– Calorimeter

geometries)

– Si tracker (2

1 geometry)

– Also Aladin,

nd, tof, Dch

– compatibility

yet with the event

generator (p,2

– initial analys

de
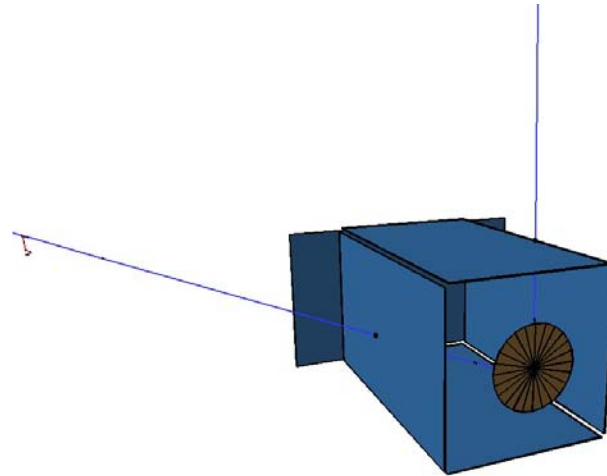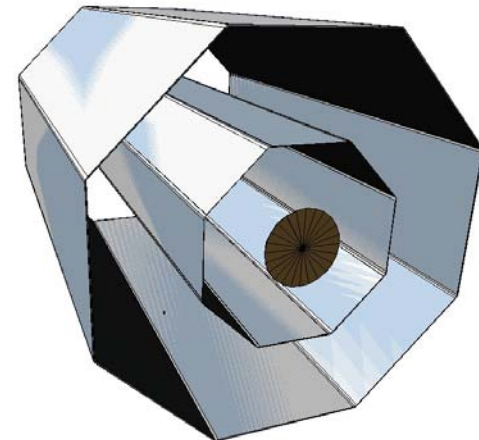
• Both

n)

Si tracker:

- ## Cubic configuration
^{12}C(p,2p) experiment
    (5x380 long. strips)
    (5x640 transv. strips)
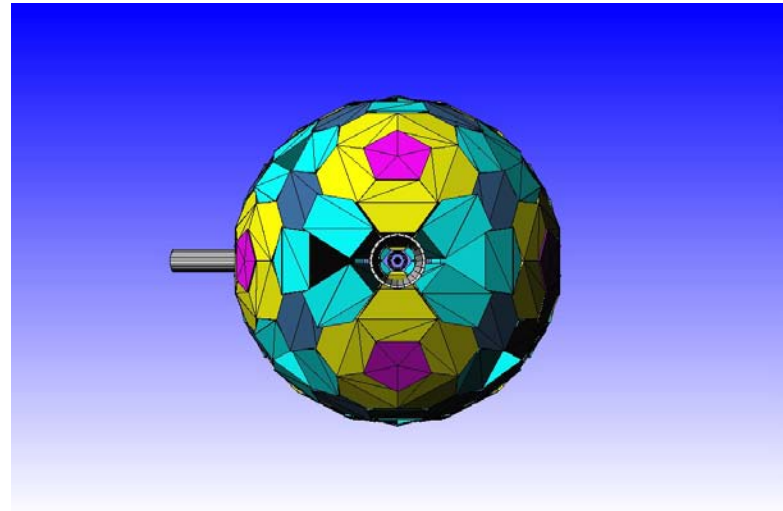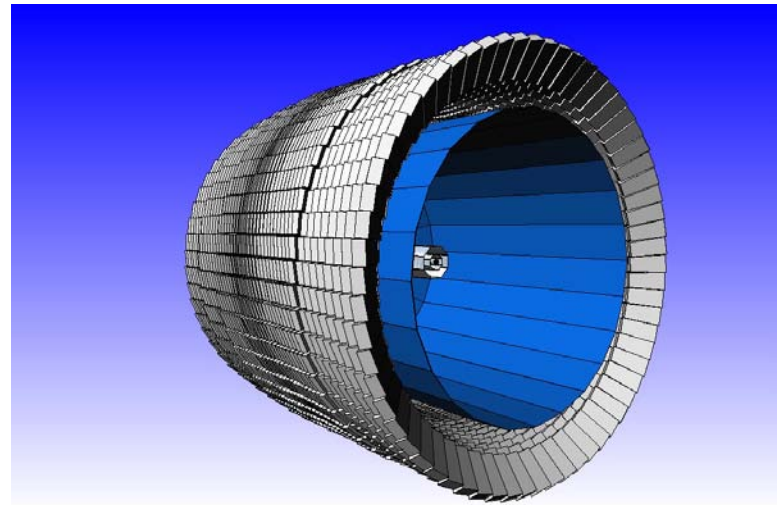
R3BSim
and
R3BROOT

- ## Double layer
of DSSSD

R3BSim
only

Calorimeter

Crystal ball
(used in $^{12}C(p,2p)$ experiment)

New design: CALIFA

Possible contribution from the UK

For R3BROOT:

- Take the responsibility for the tracker detector simulation

- Implement a realistic event generator for (p,2p)

- Develop an analysis code (valid for both simulation and data)
    - for the tracker part (at least)

For R3B (in general):

- Validate simulations using data from the ^{12}C(p,2p) experiment
(Jon Taylor - PhD student @ Liverpool)

- Finalise the new design of the new tracker detector
    - 2 or 3 layers ?
    - granularity ?
    - magnetic field ?

R3BROOT

Visit: http://cbmroot.gsi.de/installation/installation.htm

- Supported platform:
    - » Mac OS X 10.5.x
    - » Debian Etch , Lenny
    - » Fedora Core 5 (icc 10.0)
    - » Fedora Core 8/9
    - » Open Suse 10.3/11/11.1
    - » SL4/5
    - » Ubunto 8.10, 9.04

Download commands:
- External package (FAIRSOFT= ROOT, CLHEP, GEANT4, GEANT3.21, etc …):
    - svn co https://subversion.gsi.de/fairroot/fairsoft/release/july09 fairsoft

- R3BROOT:
    - svn co https://subversion.gsi.de/fairroot/r3broot/trunk r3broot
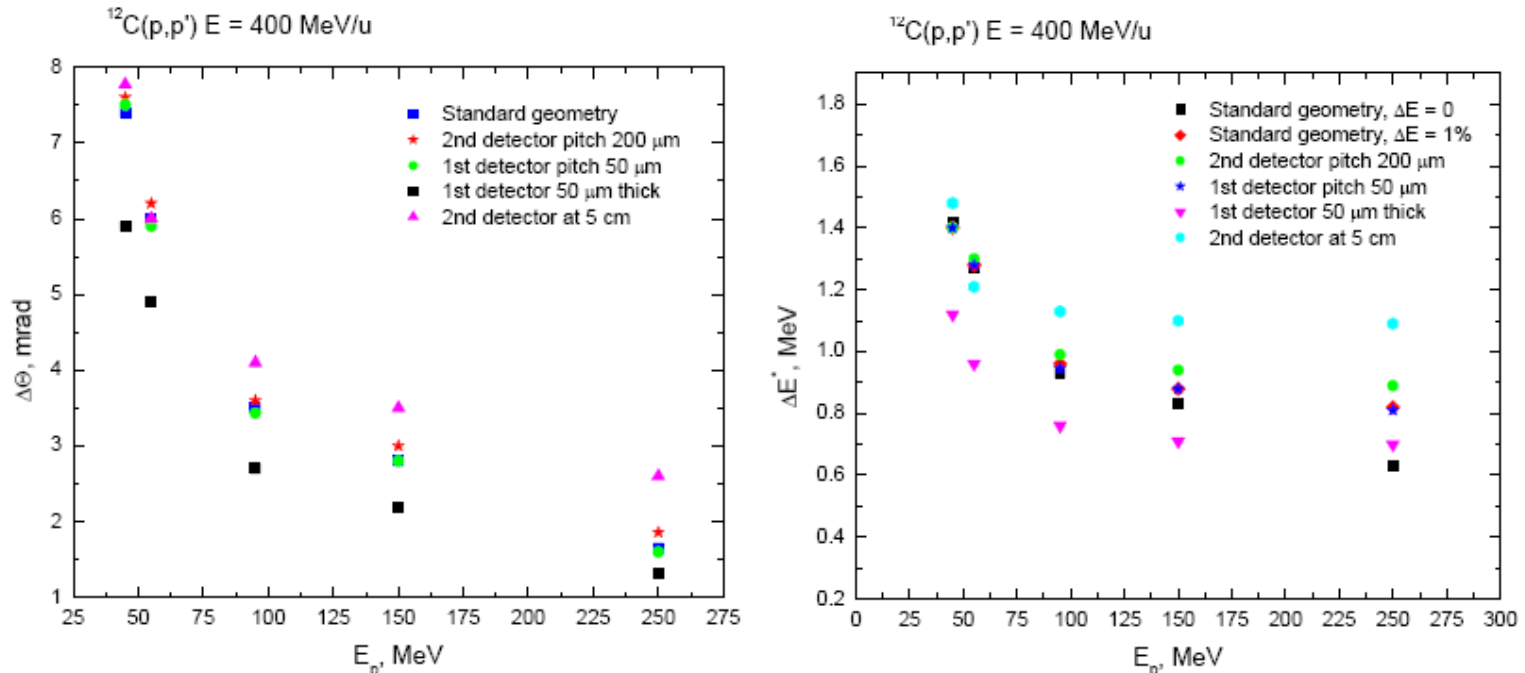
END

Simulations for target recoil tracker

Figure 4. Right panel: excitation energy resolution versus the proton recoil energy E_p for the case of inelastic scattering of $^{12}C(p,p')$ with $E = 400$ MeV/nucleon. Left panel: resolution on the centre-of-mass angle $\Delta\theta\,(\sigma)$ versus E_p for the same reaction.