

A 3D wireframe rendering of a particle accelerator's cross-section. The structure is complex, with various colored components: a central blue region, a red ring-like structure, a green component, and a yellow outer shell. The wireframe is yellow and shows the internal structure of the accelerator.

3D RAY TRACING SOFTWARE TRACE

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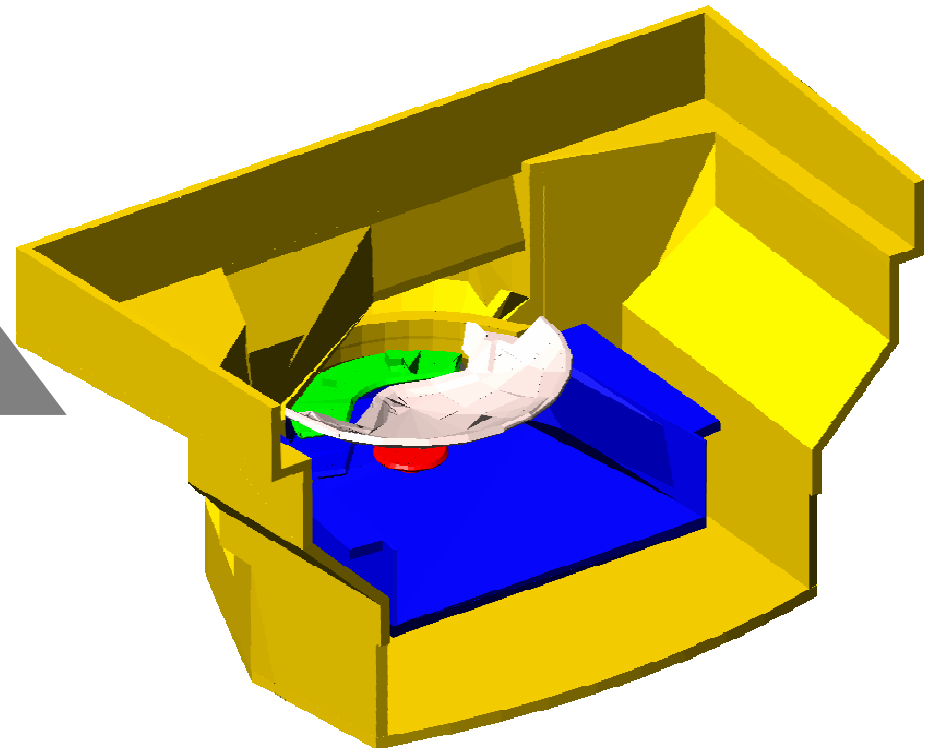
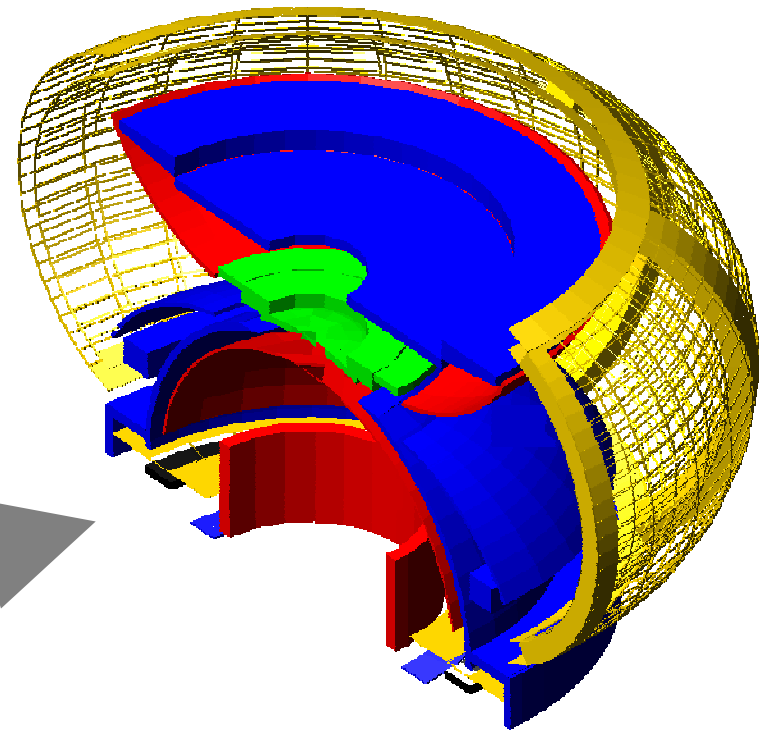
**IRAP (CESR) / CNRS / UPS
Toulouse, France**

The Features :

Full 3D configuration.

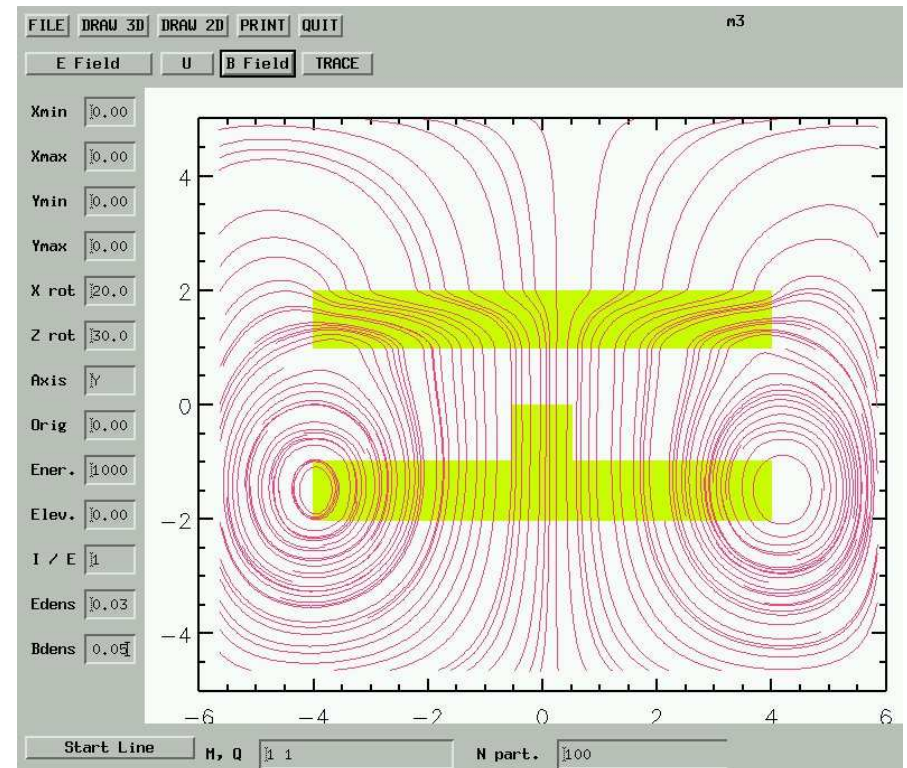
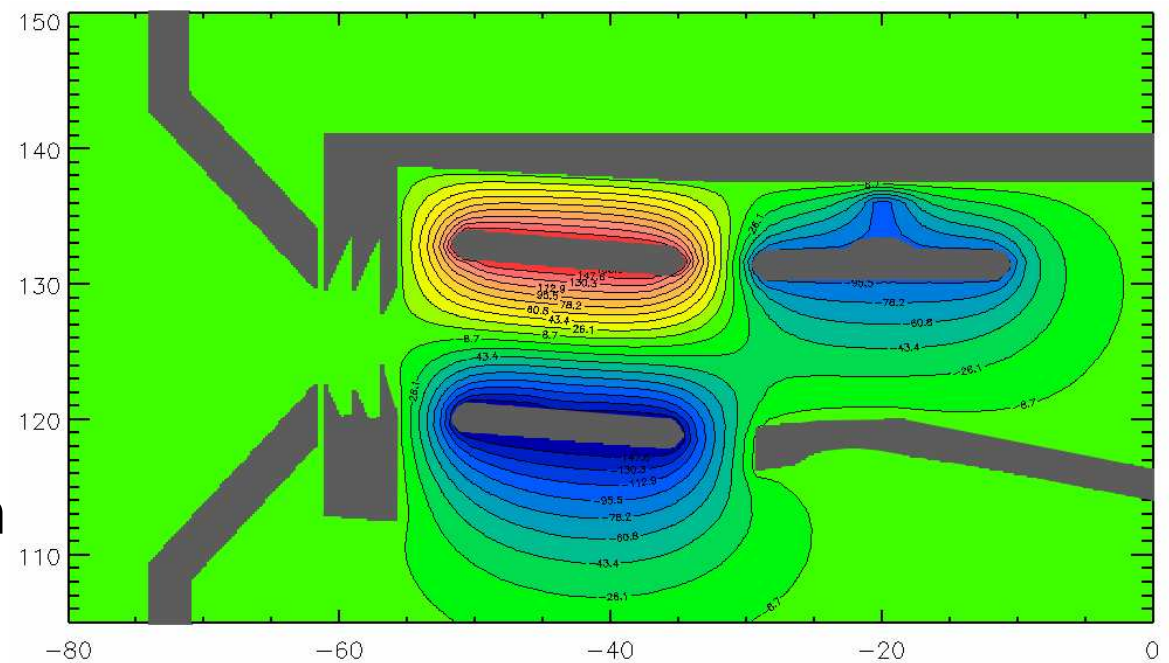
Very complex geometry is possible:

- Enhanced utilities to create a 3D configuration
- STEP files decoder (*works with limitations now, extra work needed*)
- Any spatial scale
- 3D viewer (see images) with particle trajectories
- 2D viewer with fields and particle ray tracing



The Features :

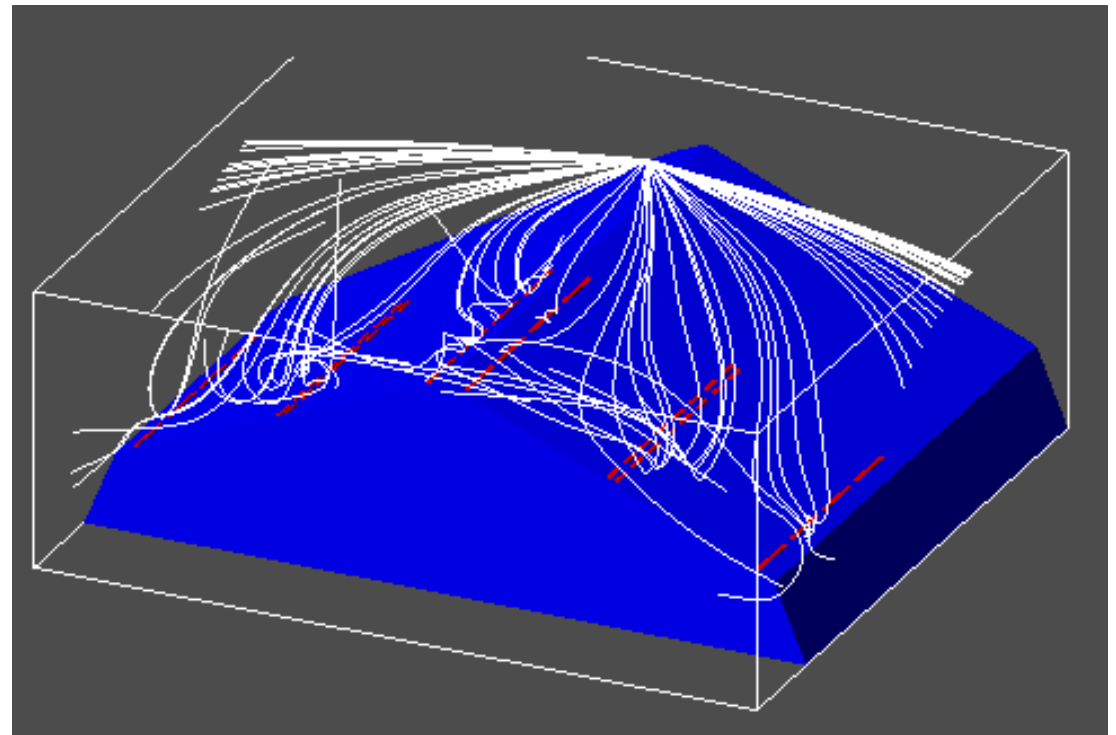
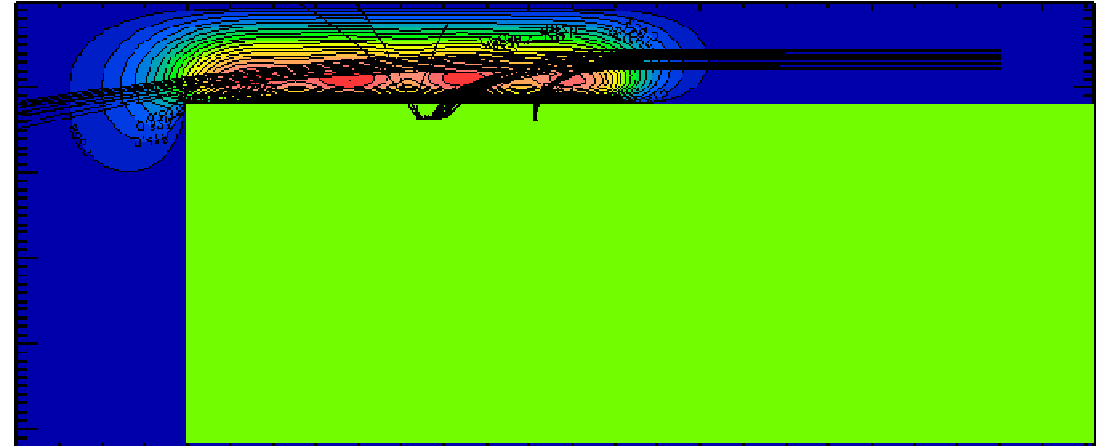
- Electric field is calculated with *exact* shape of the electrodes (*raster* in **SIMION**) .
- Magnetic field is calculated with specified constant external field, any permanent magnets configuration, and any μ -metal configuration (*no in* **SIMION**).



Usage :

- In the Trace GUI define start window, energy and direction of test particles and see the particle trajectories.
- Call the library function from your custom “C” or “IDL” program. Resulting trajectories could be seen in 3D viewer.

These two examples show 2eV electrons trajectories passing in the vicinity of the solar panels of MMO (Bepi Colombo) spacecraft.



Usage :

```
MonteCarlo(origin, V0, &AzIn, &Ein);
dUlim = Accur*Ein;
memcpy(Vcurr,V0, sizeof(point));
.....
stop = Track(CONF, origin, Vcurr,
            EorI,1,(double *)track,&size,MySurface,MyStop,&time,dUlim);
if ((size > 2) && (stop == -1))
{
```

In the last case user can include (see [MySurface](#) in the call `Track()`) any custom interaction of the particles with the surface. The [secondary and photoelectron library](#) is included in the package. The plot on the right shows a result of Trace simulation with this library. It proves that electrons measured by electron spectrometer at low energies are secondary electrons created at spacecraft surface.

