



# Bruno: first user perspective



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# Outline

- Introduction to Bruno tool
- Configuration of Bruno tool
- Working with Bruno
- Bruno tool @ Ferrara
- The future of Bruno
- Conclusion

# What is Bruno?

- Bruno is a tool developed by SuperB collaboration for checking geometry of sub-detectors with the help of GEANT4
- Some packages are needed by Bruno:  
ROOT 5.18, CLHEP 2.0.3.2, Xerces,  
Geant4 9.1.p01, GDML 2.10, SVN
- How to install Bruno?

[http://mailman.fe.infn.it/superbwiki/index.php/How to install tools for SuperB simulation](http://mailman.fe.infn.it/superbwiki/index.php/How_to_install_tools_for_SuperB_simulation)

# How to install Bruno?

(complete guide: <http://mailman.fe.infn.it/superbwiki/index.php/>

How to install tools for SuperB simulation)

- First step: download and install all packages required by Bruno
- Create a GPG-KEY
- download **superb-sim** with **yum**
- download Bruno with **svn**
- Check directories of packages installed in **sim-env.sh**
- Install Bruno

# How To configure Bruno

- ❑ IMPORTANT: install ROOT with this command `./configure --enable-gdml`
- ❑ go to `/usr/local/Bruno` and install Bruno with command **make**
- ❑ Load environment variables with **sim-env.sh**

# Example of my sim-env.sh

```
#
# CLHEP
#
export CLHEP_BASE=/usr/local/clhep
export CLHEP_VER=2.0.3.2
export CLHEP_BASE_DIR=/usr/local/clhep/${CLHEP_VER}
export CLHEP_INCLUDE_DIR=${CLHEP_BASE_DIR}/include
export CLHEP_LIB_DIR=${CLHEP_BASE_DIR}/lib
export CLHEP_LIB=CLHEP

LD_LIBRARY_PATH="$CLHEP_LIB_DIR:${LD_LIBRARY_PATH:+$LD_LIBRARY_PATH}"
export LD_LIBRARY_PATH

#
# Geant4
#
export G4BASE=/usr/local/cern/geant4/9.1.p01
export G4INSTALL=${G4BASE}
export G4SYSTEM=Linux-g++
export G4INCLUDE=${G4BASE}/include/geant4
export G4DATA=/usr/local/cern/geant4/data
export G4LEVELGAMMADATA=${G4DATA}/PhotonEvaporation2.0
export G4RADIOACTIVEDATA=${G4DATA}/RadioactiveDecay3.1
export G4LEDATA=${G4DATA}/G4EMLOW5.1
export G4NEUTRONHPDATA=${G4DATA}/G4NDL3.12
export G4ELASTICDATA=${G4DATA}/Elastic1.0
```

```
#
# GDML
#
export GDMLVER=2.10
export GDMLBASE=/usr/local/cern/GDML/${GDMLVER}
export GDMLINC=${GDMLBASE}/include
export GDMLLIB=${GDMLBASE}/lib

LD_LIBRARY_PATH="$GDMLLIB:${LD_LIBRARY_PATH:+$LD_LIBRARY_PATH}"
export LD_LIBRARY_PATH

#
# ROOT
#
export ROOTVER=5.18
export ROOTSYS=/usr/local/root/${ROOTVER}
export ROOT_BASE=${ROOTSYS}
export ROOT_LIB=${ROOT_BASE}/lib/root

LD_LIBRARY_PATH="$ROOT_LIB:${LD_LIBRARY_PATH:+$LD_LIBRARY_PATH}"
export LD_LIBRARY_PATH
PATH="$ROOT_BASE/bin:${PATH:+$PATH}"
export PATH

#
# XERCES-C
#
export XERCESLIB=/usr/local/superb/lib
LD_LIBRARY_PATH="$XERCESLIB:${LD_LIBRARY_PATH:+$LD_LIBRARY_PATH}"
export LD_LIBRARY_PATH
```

# Start with Bruno

```
[superB@babbar2 Bruno]$ pwd  
/usr/local/Bruno  
[superB@babbar2 Bruno]$ source ../superb/bin/sim-env.sh  
[superB@babbar2 Bruno]$ |
```



**Environment variables exported**

*created alias in /home/user/.bashrc:*

```
alias bruno='/usr/local/Bruno/bin/Linux-g++/Bruno'
```

**Ready to start**

# Bruno @ Ferrara

```
[superB@babar2 Bruno]$ ls
BaBar.gdml                bin                      EMC_barrel_shape_xtals.gdml  gdml_parameterised.xsd     IFR_fwd_endcap_scint.gdml    SuperB_IFR.gdml
Backward_external_Stopper.gdml Bruno.cc                 EMC_barrel_structure.gdml    gdml_replicas.xsd         include                       SuperB_IFR.gdml.save
bar_approxOK.gdml        bwd.gdml                final_focus.gdml             gdml_solids.xsd           inner_detector_assembly.gdml SuperB_minimal.gdml
bar.gdml                  bwd.gdml~               final_focus_short.gdml      gdml.xsd                   newgeo2.gdml                 SVT.gdml
bar.gdml~                 bwd_original.gdml       Forward_external_Stopper.gdml gdmlmakefile               novis.mac                    test.root
bar_last1.gdml            CORRECT_SUPERB.gdml     fwd.gdml                     IFR_barrel.gdml           out                           tmp
bar_last2.gdml            dawn.mac                 fwd_original.gdml           IFR_barrel.gdml_originale  setup.sh                      tou.mac
bar_last.gdml             DCH_container.gdml     gdml_core.xsd               IFR_barrel_scint.gdml     Solenoid_DCH_etal.gdml      vis.mac
bar_nocryo_nocyl.gdml    DRCMOM.gdml             gdml_define.xsd             IFR_bwd_endcap.gdml       Solenoid.gdml
bar_originale.gdml        EM1S.gdml               gdml_extensions.xsd         IFR_bwd_endcap_scint.gdml  src
bfield.root              EMCA.gdml               gdml_materials.xsd          IFR_fwd_endcap.gdml       SuperB.gdml
[superB@babar2 Bruno]$
```

command  
for  
starting

```
[superB@babar2 Bruno]$ bruno -g SuperB_IFR.gdml -o prova.gdml
Bogus control parameters:
BField model: "barrel"
Field Strength: 1.50000e+00 tesla
Field Rmax: 1.50000e+02 cm
Field Zmin: -2.00000e+02 cm
Field Zmax: 2.00000e+02 cm
Use BgsPhysics: no
Range cut: 1.00000e-01 mm
Use BgsTransport: no
max tracking step size: 1.00000e+00 mm
max vac step size: 1.00000e+00 mm
material name of vacuum Vacuum
Energy cuts for
neutron fix process: 1.00000e+00 MeV
high precision neutrons: no
ion fix process: 1.00000e+00 MeV
Looper cut: 1.00000e-03 MeV
Minimum Energy: 1.00000e-03 MeV
Maximum Energy: 1.00000e+01 MeV
Max Number Step: 10000
G4 Stepper: "HelixImplicitEuler"
G4 Step Toler: 1.00000e+00 micron
G4 Inter Toler: 1.00000e+00 micron
```

output file  
created in  
./out

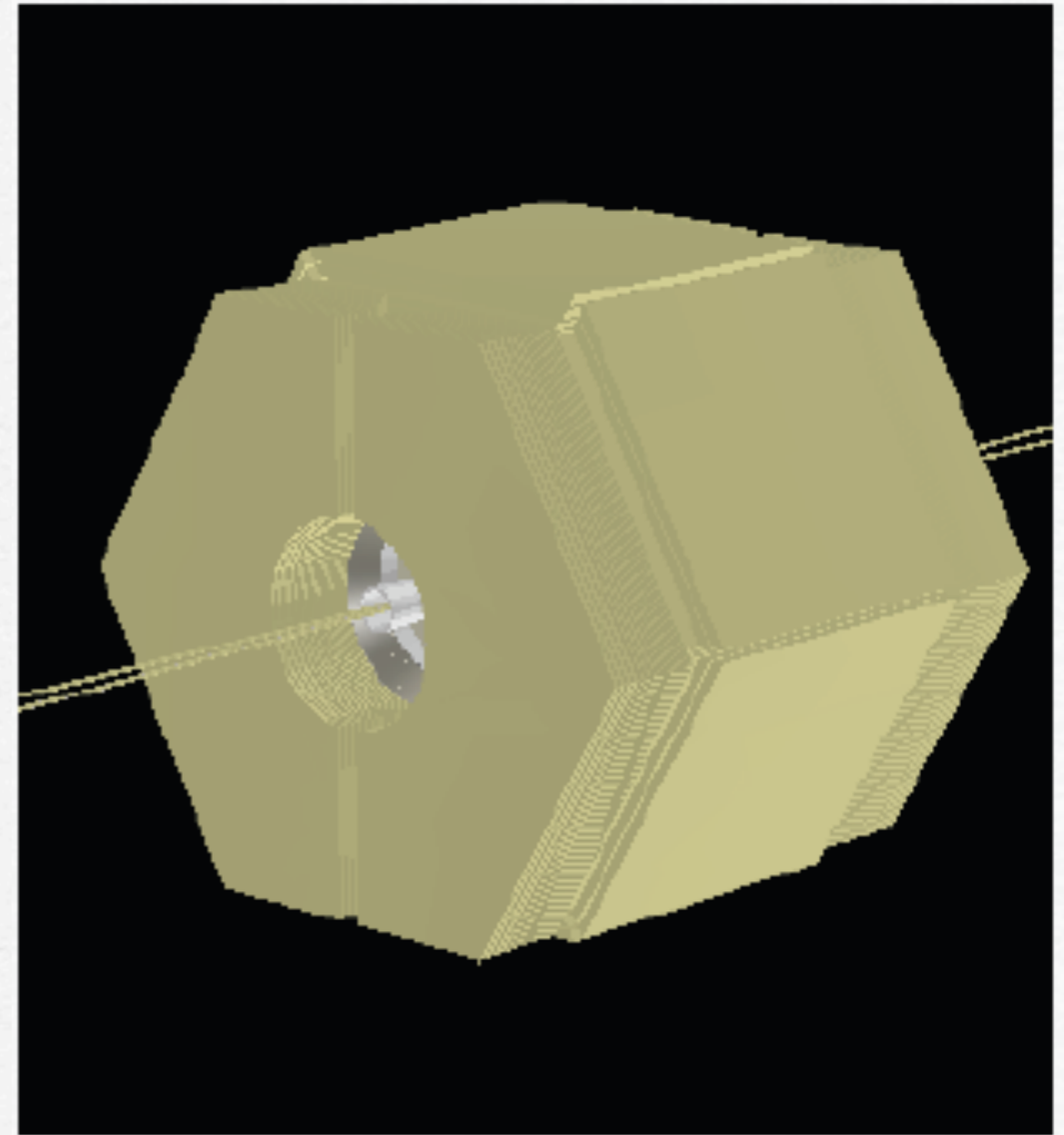


# Output file

```
[superB@babbar2 out]$ root -l
root [0] gSystem->Load("libGeom");
root [1] TGeoManager::Import("prova.gdml");
Info: TGeoManager::Import: Reading geometry from file: prova.gdml
Info in <TGeoManager::TGeoManager>: Geometry Geometry, default geometry created
Info in <TGeoManager::SetTopVolume>: Top volume is World. Master volume is World
Info in <TGeoManager::CheckGeometry>: Fixing runtime shapes...
Info in <TGeoManager::CheckGeometry>: ...Nothing to fix
Info in <TGeoManager::CloseGeometry>: Counting nodes...
Info in <TGeoManager::Voxelize>: Voxelizing...
Info in <TGeoManager::CloseGeometry>: Building cache...
Info in <TGeoNavigator::BuildCache>: --- Maximum geometry depth set to 100
Info in <TGeoManager::CloseGeometry>: 23157 nodes/ 329 volume UID's in default geometry
Info in <TGeoManager::CloseGeometry>: -----modeler ready-----
root [2] gGeoManager->GetTopVolume()->Draw("ogl");
<TCanvas::MakeDefCanvas>: created default TCanvas with name c1
root [3] |
```

commands for charging the  
geometry

# What I see?(I)



[http://mailman.fe.infn.it/superbwiki/index.php/Geant4\\_SuperB\\_simulation\\_main\\_portal/IFR](http://mailman.fe.infn.it/superbwiki/index.php/Geant4_SuperB_simulation_main_portal/IFR)

# Bruno's future

- Possible migration to Python: Why not?
- What does require the migration to Python?
- All infos are @ wiki page ([http://mailman.fe.infn.it/superbwiki/index.php/How\\_to\\_install\\_tools\\_for\\_SuperB\\_simulation](http://mailman.fe.infn.it/superbwiki/index.php/How_to_install_tools_for_SuperB_simulation))
- With the use of Bruno we have done the new IFR with corner block (see talk of Gianluigi Cibinetto today)

# Conclusions

- Bruno tested with success
- All documentation is @ wiki pages
- The migration to Python is welcome
- waiting for new setup software

# Other Slides

