Use of GENIE in LArSoft

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December 2012

Organization of LArSoft

Tuesday, December 11, 12
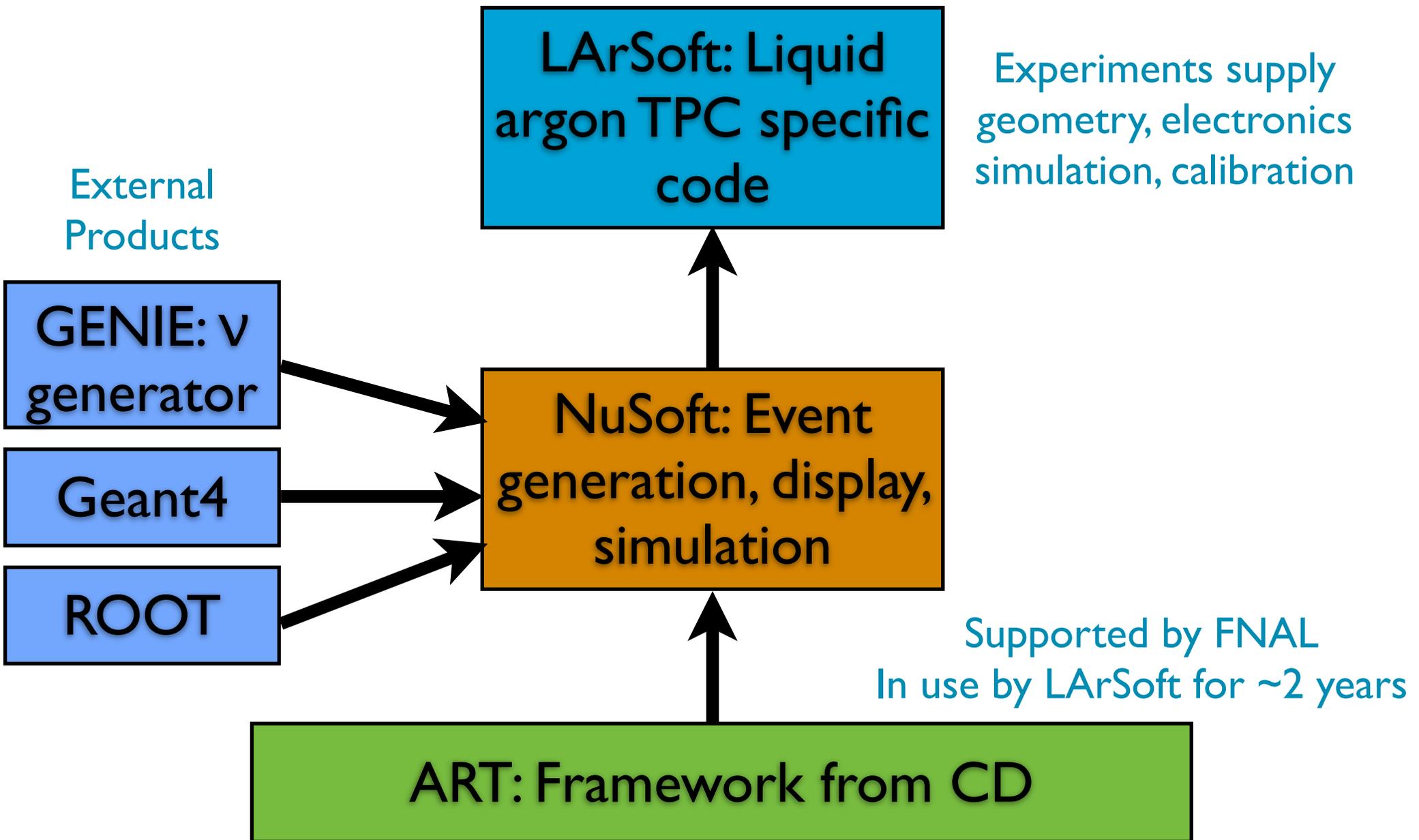
GENIEHelper

- Communication between LArSoft modules and GENIE is done with the GENIEHelper object

- Configurable to set detector geometry, any fiducial volumes, top volumes, etc

- Also set flux files, which flavors to use

- Then user sends GENIE the configuration signals based on the input values

- User sets only a few GENIE environmental variables in job - GEVGL, GSEED, GSPLOAD, GXMLPATH

- Use the GENIE event record to fill MC truth data product that is used by LArSoft - get all the particles in the final state from the GHepParticle iterator in the record

- In practice never change the defaults from UserPhysicsOptions.xml, except to force charm and tau decays

GENIEHelper

- Differences in the UserPhysicsOptions.xml file are:

```
<    <param type="bool" name="DecayParticleWithCode=411">   false </param>  <!-- D^{+}           -->
<    <param type="bool" name="DecayParticleWithCode=-411">  false </param>  <!-- D^{-}           -->
<    <param type="bool" name="DecayParticleWithCode=421">   false </param>  <!-- D^{0}           -->
<    <param type="bool" name="DecayParticleWithCode=-421">  false </param>  <!-- \bar{D^{0}}      -->
<    <param type="bool" name="DecayParticleWithCode=431">   false </param>  <!-- D_{s}^{+}        -->
<    <param type="bool" name="DecayParticleWithCode=-431">  false </param>  <!-- D_{s}^{-}        -->
<    <param type="bool" name="DecayParticleWithCode=4122">  false </param>  <!-- Lambda_{c}^{+}   -->
<    <param type="bool" name="DecayParticleWithCode=4112">  false </param>  <!-- Sigma_{c}^{0}    -->
<    <param type="bool" name="DecayParticleWithCode=4212">  false </param>  <!-- Sigma_{c}^{+}    -->
<    <param type="bool" name="DecayParticleWithCode=4222">  false </param>  <!-- Sigma_{c}^{++}   -->
---
>    <param type="bool" name="DecayParticleWithCode=411">   true  </param>  <!-- D^{+}           -->
>    <param type="bool" name="DecayParticleWithCode=-411">  true  </param>  <!-- D^{-}           -->
>    <param type="bool" name="DecayParticleWithCode=421">   true  </param>  <!-- D^{0}           -->
>    <param type="bool" name="DecayParticleWithCode=-421">  true  </param>  <!-- \bar{D^{0}}      -->
>    <param type="bool" name="DecayParticleWithCode=431">   true  </param>  <!-- D_{s}^{+}        -->
>    <param type="bool" name="DecayParticleWithCode=-431">  true  </param>  <!-- D_{s}^{-}        -->
>    <param type="bool" name="DecayParticleWithCode=4122">  true  </param>  <!-- Lambda_{c}^{+}   -->
>    <param type="bool" name="DecayParticleWithCode=4112">  true  </param>  <!-- Sigma_{c}^{0}    -->
>    <param type="bool" name="DecayParticleWithCode=4212">  true  </param>  <!-- Sigma_{c}^{+}    -->
>    <param type="bool" name="DecayParticleWithCode=4222">  true  </param>  <!-- Sigma_{c}^{++}   -->
537,538c537,538
<    <param type="bool" name="DecayParticleWithCode=15">   false </param>  <!-- tau^{-}          -->
<    <param type="bool" name="DecayParticleWithCode=-15">  false </param>  <!-- tau^{+}          -->
---
>    <param type="bool" name="DecayParticleWithCode=15">   true  </param>  <!-- tau^{-}          -->
>    <param type="bool" name="DecayParticleWithCode=-15">  true  </param>  <!-- tau^{+}          -->
```

Versions

- We have used svn revisions rather than tagged releases because the tags don't evolve quickly enough

- Frequently Robert H has added functionality that we have needed to generate events efficiently that we couldn't wait on a GENIE revision tag to get

- The svn revisions of trunk we have used are: 3665, 3470, 3334 (over a year ago), others even farther in the past