

Detector Identifier and Geometry Management System in the JUNO Offline Software

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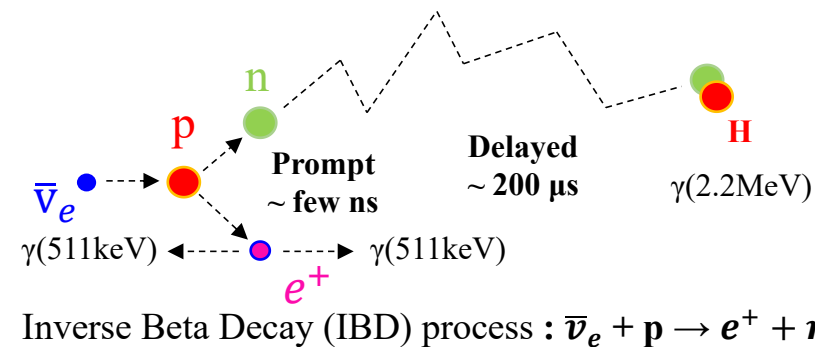
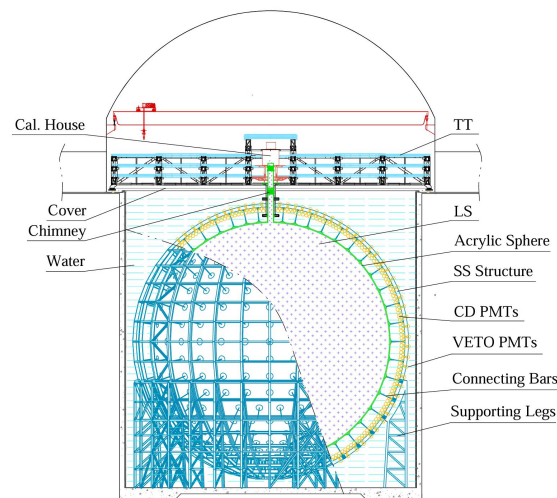
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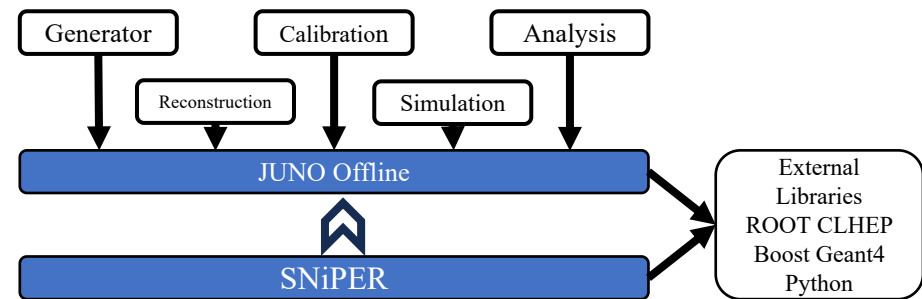
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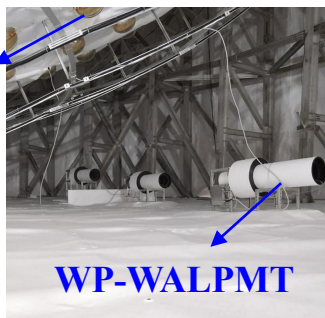
Introduction of JUNO Experiment



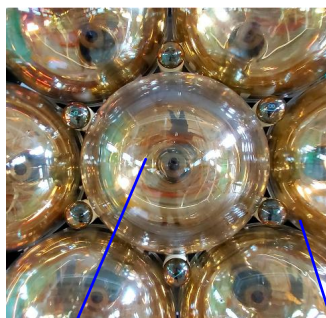
- **JUNO (Jiangmen Underground Neutrino Observatory)** is an international large-scale neutrino experiment located 700 meters underground in Kaiping, Guangdong Province, China.
- **Primary physics goals:**
 - Determine the neutrino mass ordering with a significance of 3~4 σ .
 - Measure neutrino oscillation parameters with unprecedented precision (up to 0.6%).
 - Search for physics beyond the Standard Model.
- **JUNO offline software (JUNOSW)** has been developed to fulfill various demands of JUNO



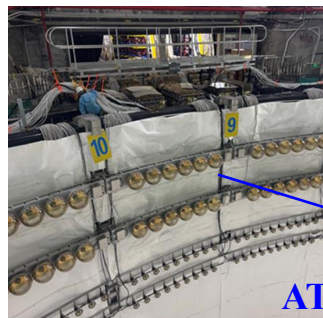
WP-VPMT



WP-WALPMT



CDLPMT



CDSPMT

WP-ATMPMT

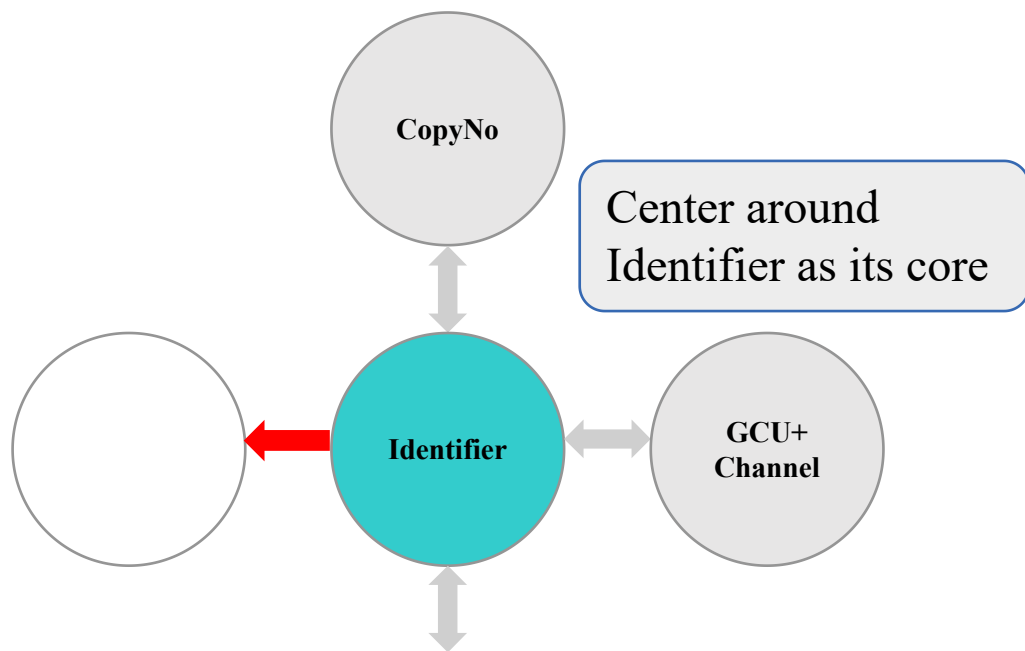
- Status of PMTs in JUNO :
 - **17596** CD-LPMT (20-inch), **25600** CD-SPMT (3-inch), **2399** WP-VPMT (20-inch), **5** WP-WALPMT (20-inch) , **348** WP-ATM-LPMT (20-inch) and **600** WP-ATM-MPMT(8-inch) **are installed.**

Introduction of Identifier Service System

- Various applications (offline, DAQ, Electronic box, Install-ID, etc.) have their own numbering rules to distinguish each PMT.
- ID Mapping Service (**IDService**) provides correlations between different ID systems and between ID systems and geometric information.

➤ IDService is initialized :

- To Generate **Identifier** for each detector unit (PMT)
- To construct the **bi-directional** correlation mapping between Identifier and different **ID systems** :
CopyNo $\leftrightarrow$ Identifier (complete)
GCU + Channel $\leftrightarrow$ Identifier (complete for installed PMTs)
- To construct the **single-directional** correlation mapping between Identifier and **geometric information**:
Identifier $\rightarrow$ x, y, z ... (complete)
- Outside the SNIper framework and support multiple methods to access



Introduction of Geometry Management System

- Geometry management of JUNO is designed as a **dual-geometry system**: consists of parameter service and geometry service system.

- Simple geometric structure (parameter service)

- **Quickly** access key detector geometry information
- Aimed at **reducing** memory consumption

- Full geometric structure (geometry service)

- Provide access to all **detailed** detector information
- Offer a comprehensive description of the detectors
- Initialized with GDML from GDML file exported in simulation

