



Event Selection & Energy Correction

15.12.2018

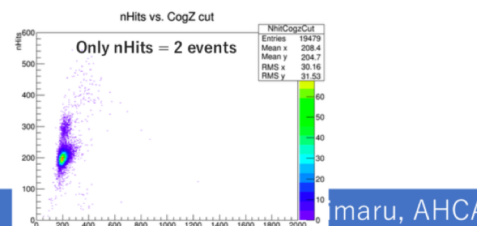
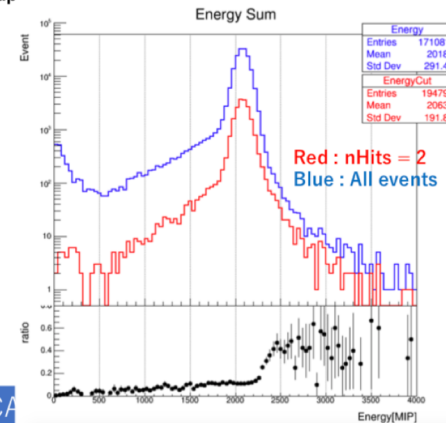
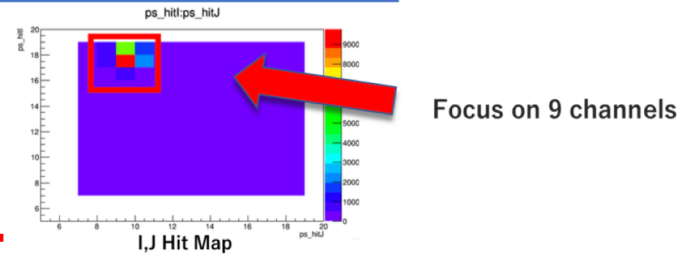
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AHCAL Analysis Workshop, Dec. 2018

Additional Study on Event Selection

- Main meeting report slide.
- Confirm whether nHits=2 events mean that a particle hits between 2 channels.

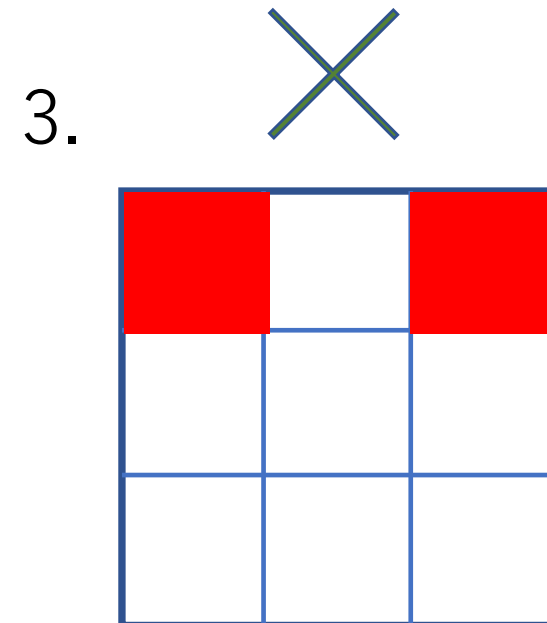
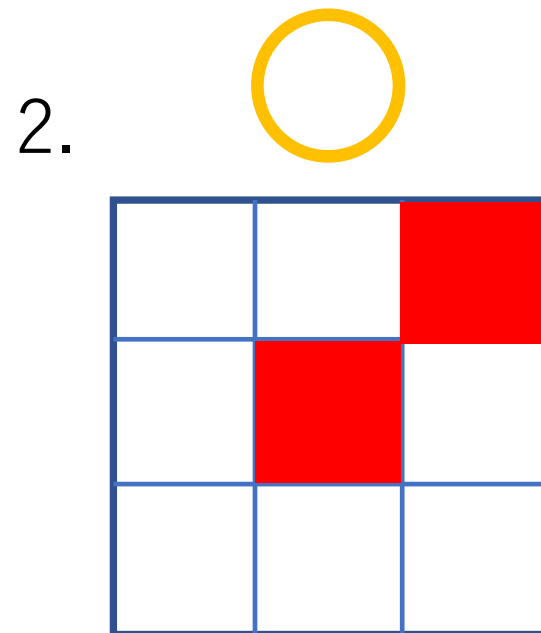
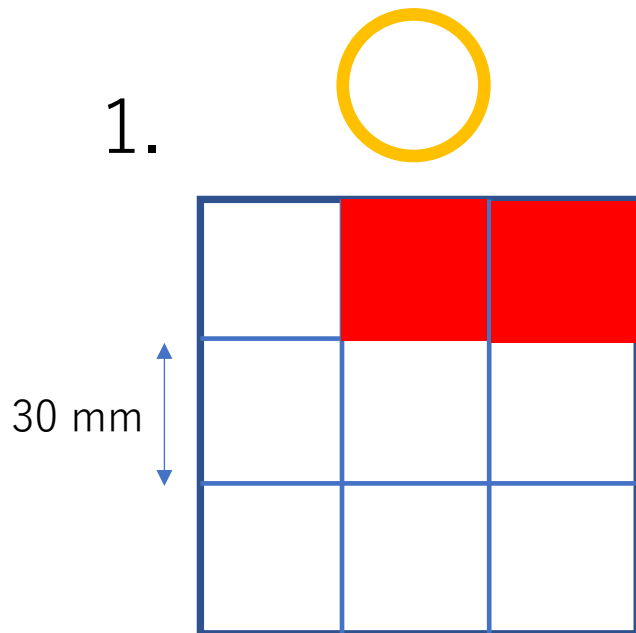
Number of Hits of PS Detector = 2

- electron 50GeV
- Run : 061214
- It is likely that nHits=2 events mean that a particle hits between 2 channels.
- The number of events = 19479/171081
- Smaller fraction of tail events for nHits = 2



Procedure

- Count events which a distance of two channels is smaller than $30\sqrt{2}$
 1. A hit channel is closest to the other channel.
 2. Two hit channels are the diagonal positional relationship.
 3. Not count



Result

- **Electron**

- Run 61202, 10GeV : $4366/5178 = 84.3 \%$
- Run 61213, 30GeV : $16504/18407 = 89.7 \%$
- Run 61214, 50GeV : $18002/19479 = 92.4 \%$
- Run 61217, 100GeV : $12696/13528 = 93.8 \%$

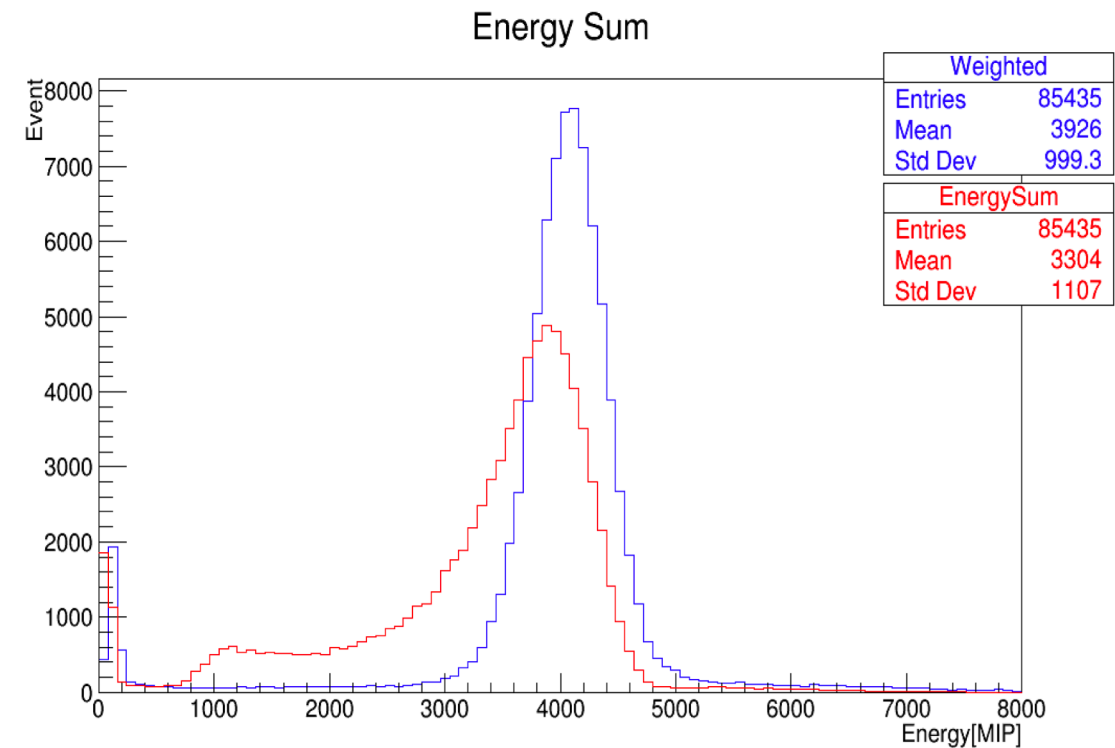
- **Pion**

- Run 61275, 40 GeV : $1920/2389 = 80.4 \%$
- Run 61280, 80GeV : $1575/2008 = 78.4 \%$
- Run 61230, 160GeV : $1798/2010 = 89.5 \%$

- **Most events of nHits=2 have events which a positional relationship of two response channels is close.**

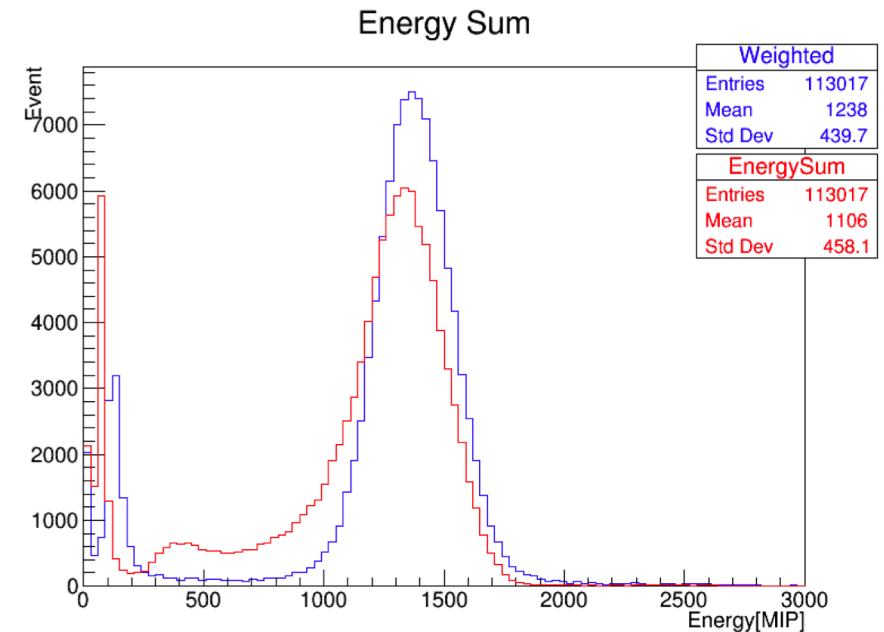
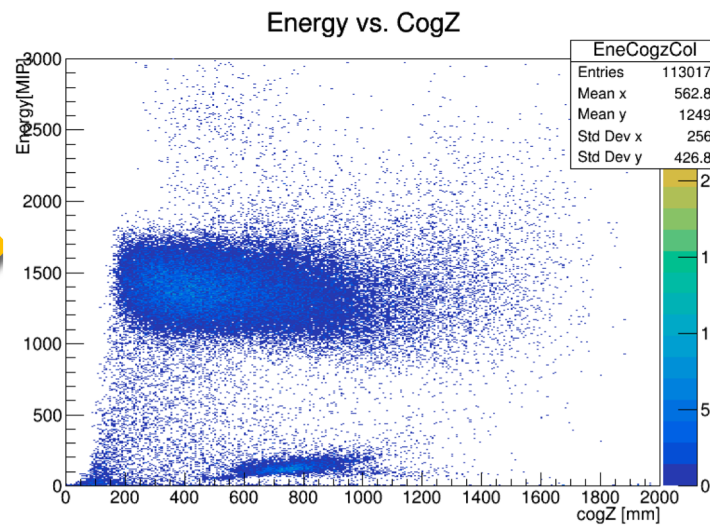
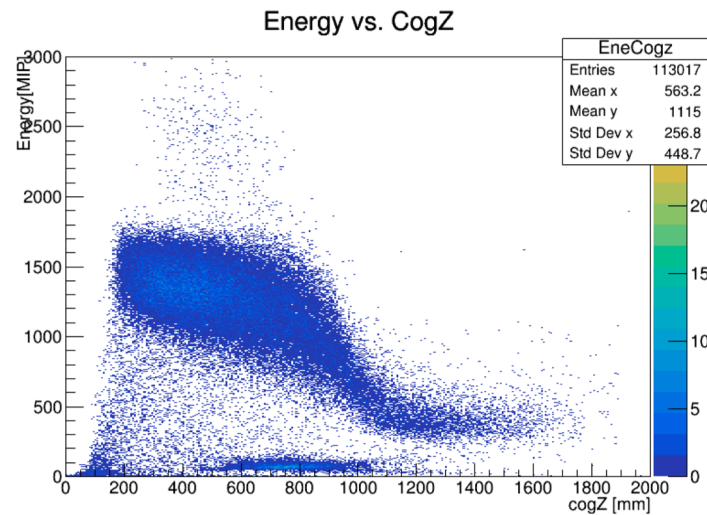
Simple Weight

- **Simple weight : ratio of absorber thicknesses**
 - **AHCAL 39th layer**
 - Absorber is three times thicker than other layers.
 - **1st layer of Tail Catcher**
 - Ratio : $(17.2 \times 3 + 2.00)/17.2$
 - **Other layers of Tail Catcher**
 - Ratio : $74.0/17.2$
- **Run 61285, Pion 120 GeV**



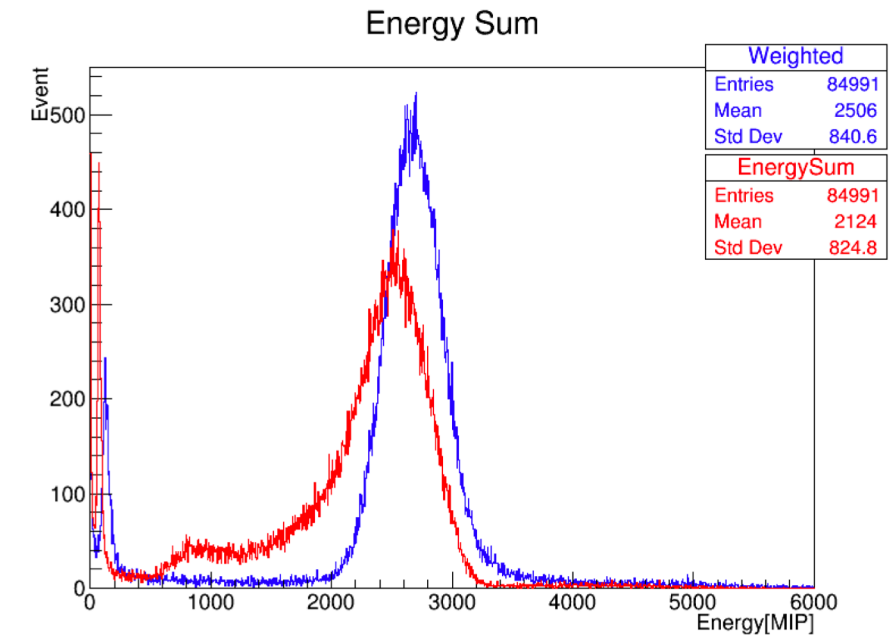
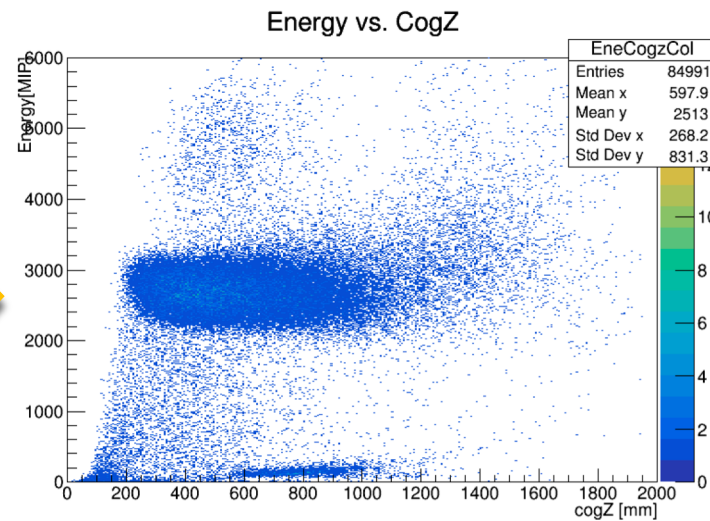
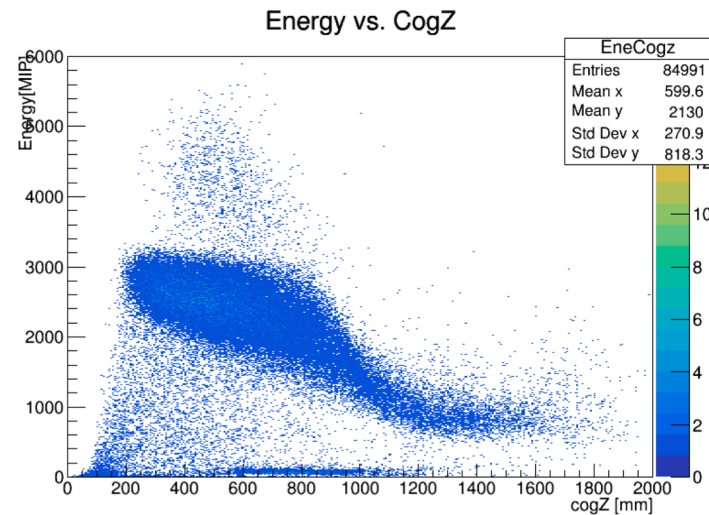
Results for Other Energies

- Run 61275, Pion 40 GeV



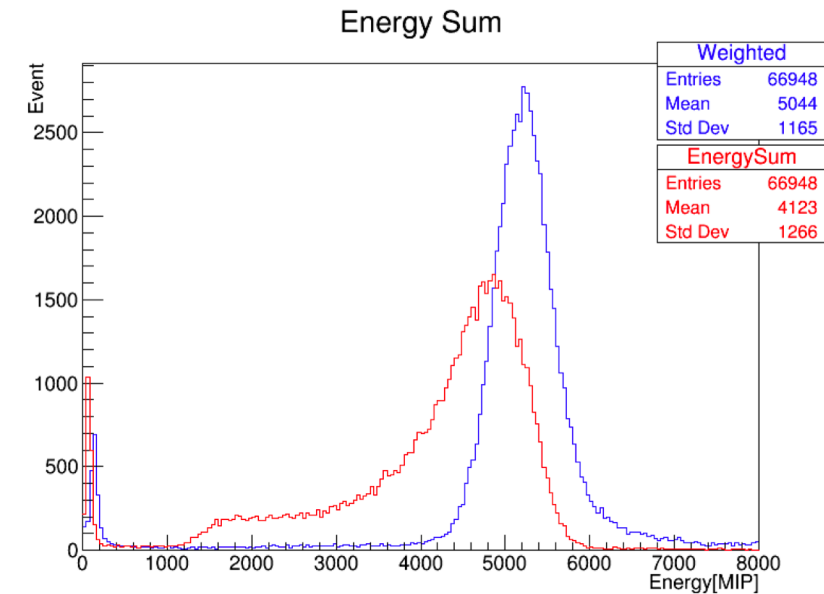
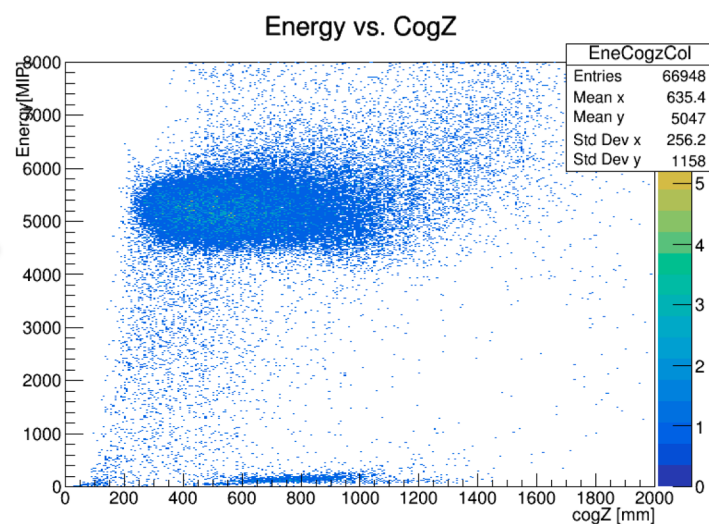
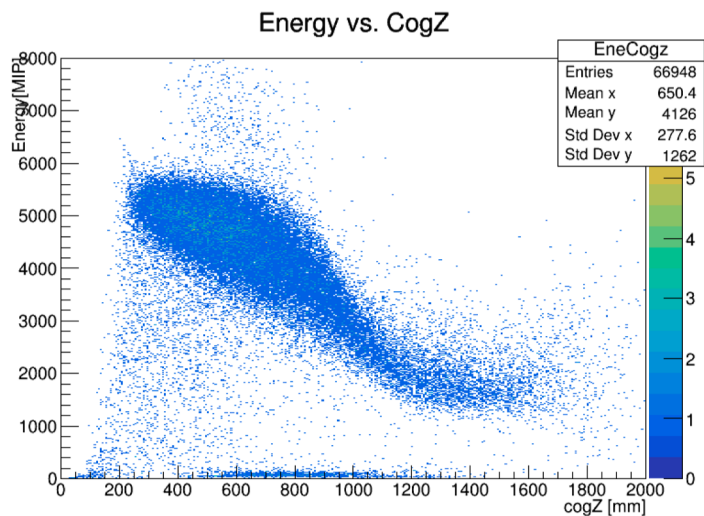
Results for Other Energies

- Run 61280, Pion 80 GeV



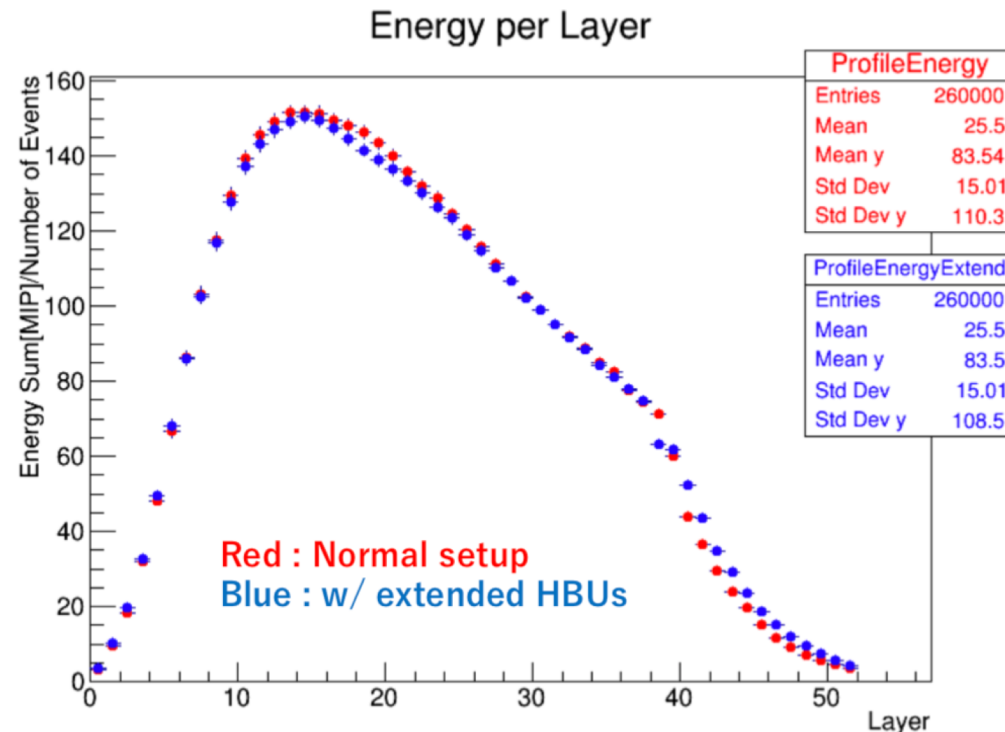
Results for Other Energies

- Run 61230, Pion 160 GeV
- Tail appears in higher energy.
 - We must consider a better optimal weight.



Todo

- **Combine this weight and the ratio of normal TC and extended TC.**
 - Solve many problem on MC/Data comparison and differences of normal/extended TC.



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