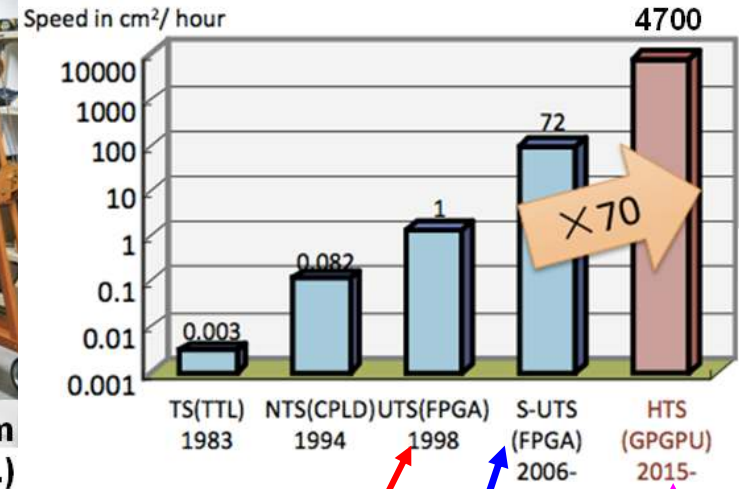
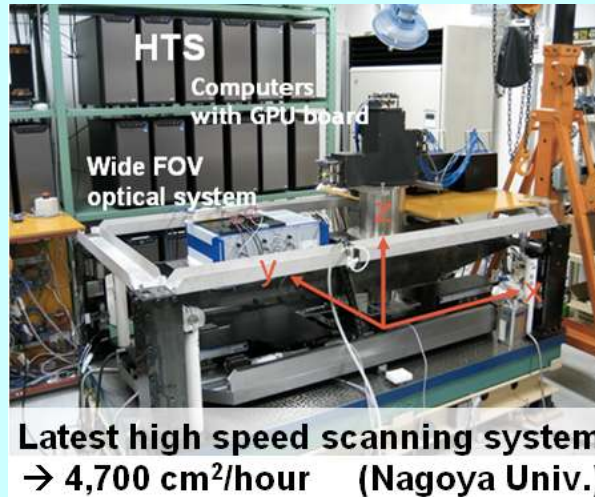
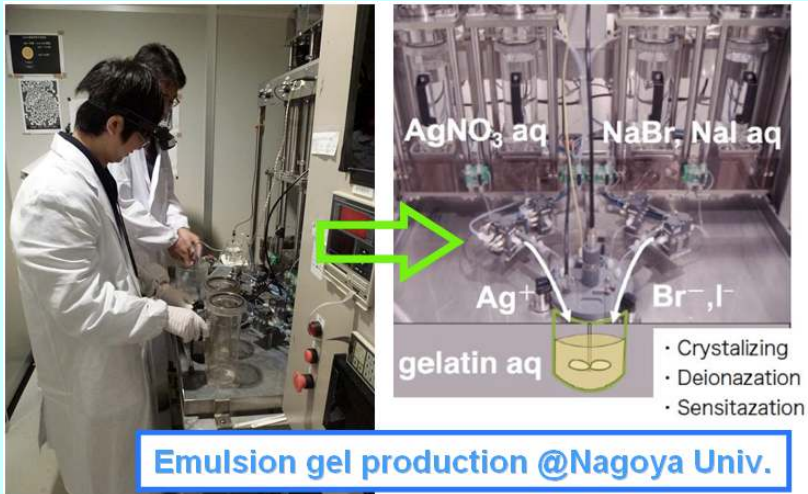


# Precise measurement of Neutrino Cross-sections and Neutrino Flux with Hybrid **Emulsion** Experiments for finding neutrino CP violation - **NINJA** and **EMPHATIC** -

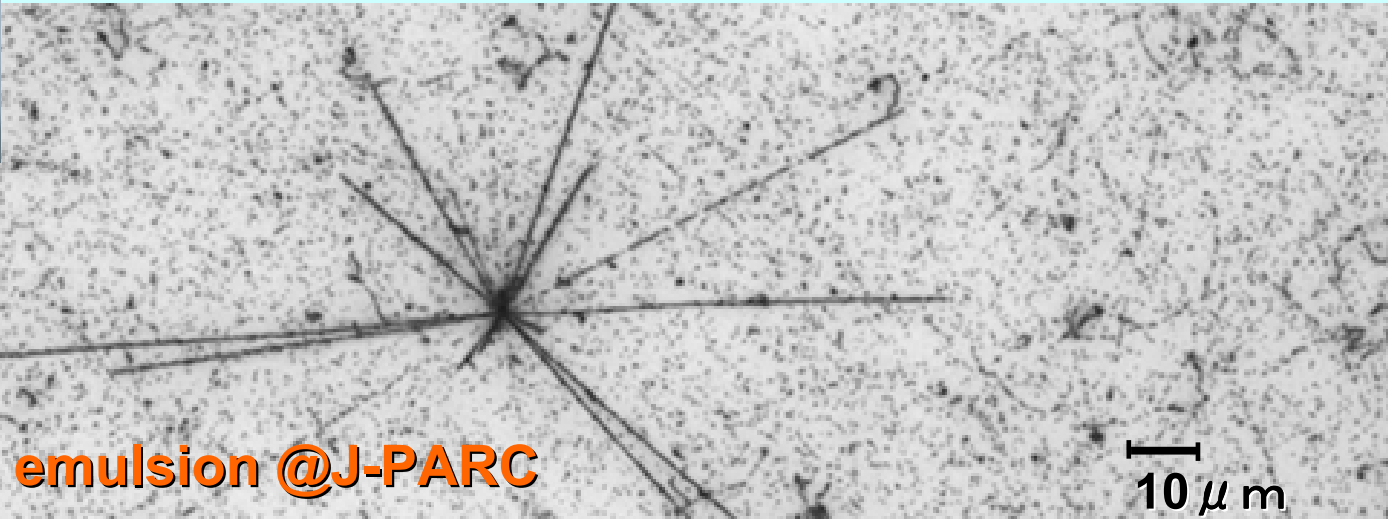
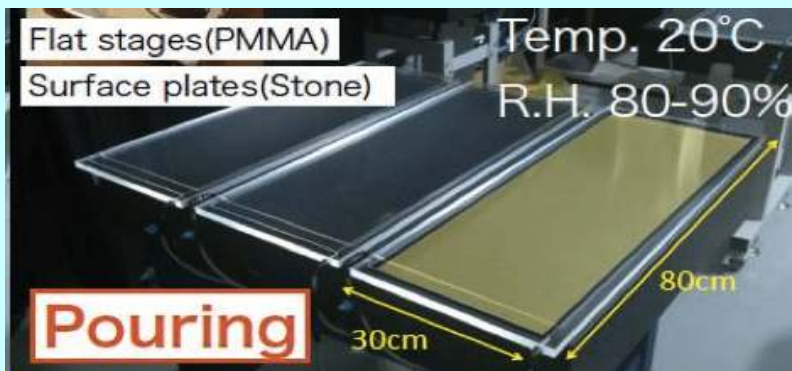
T. Fukuda (Nagoya University)  
on behalf of the NINJA Collaboration  
and the EMPHATIC Collaboration

NEUTRINO 2018, 4th Jun. 2018, Heidelberg, Germany

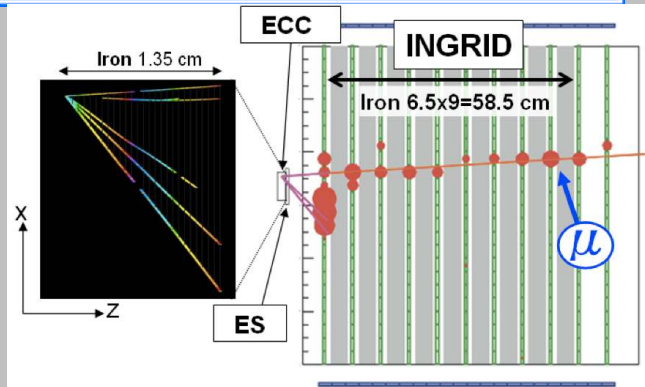
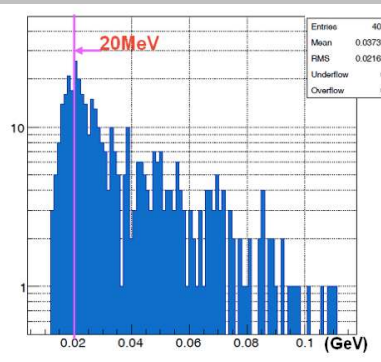
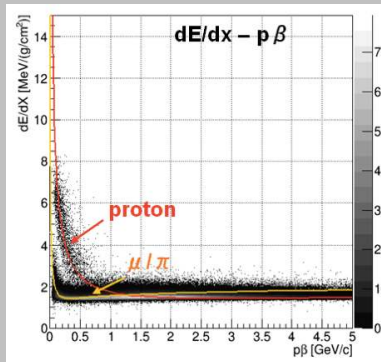
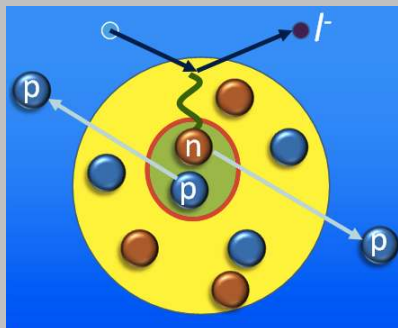


**DONUT** **OPERA** **NEW**

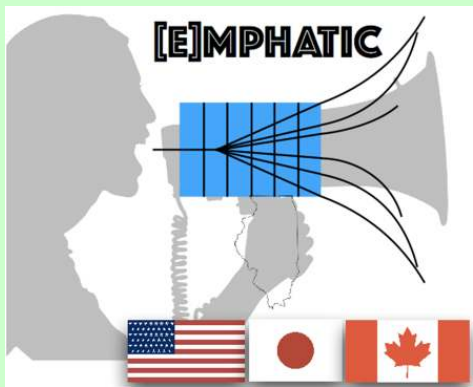
**We have developed the emulsion technology beyond DONUT and OPERA !!**



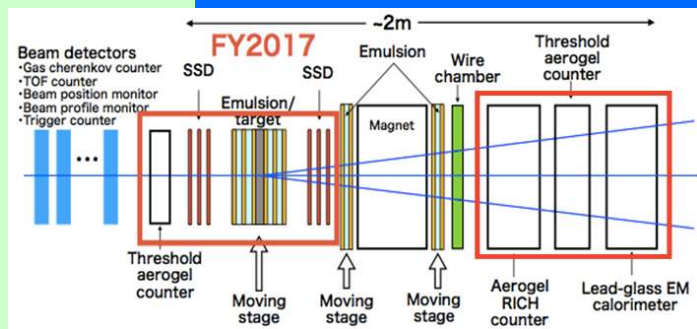




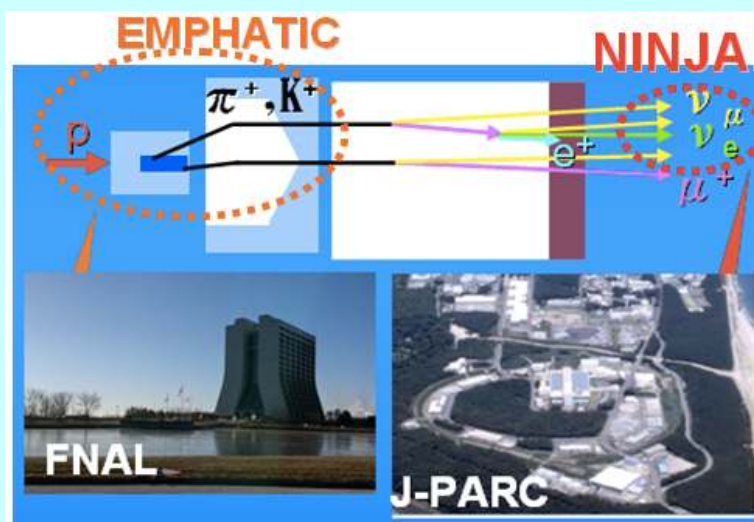
Contribution for the detailed study of  $\nu$  - Water interactions, 2p2h, CC1  $\pi$ ,  $\nu_e$  PHYSICS run is coming soon, 2019.



### Emulsion-based Measurement of Production of Hadron At a Test beam In Chicagoland



Precise measurement of hadron production is useful to reduce the systematic uncertainty from  $\nu$  flux



Advanced emulsion technology is one of key to find  $\nu$  CPV!!

