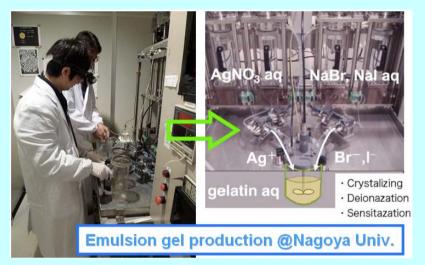
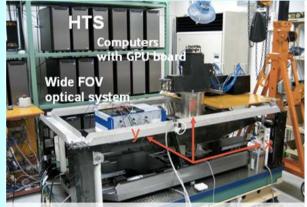
## Precise measurement of Neutrino Cross-sections and Neutrino Flux with Hybrid Emulsion Experiments for finding neutrino CP violation (Nagoya University) T. Fukuda

- NINJA and EMPHATIC -

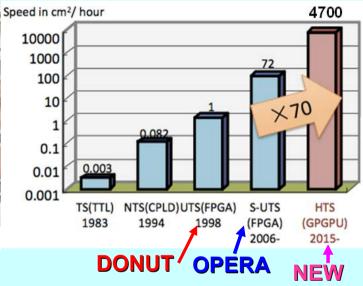
NEUTRINO 2018, 4th Jun. 2018, Heidelberg, Germany

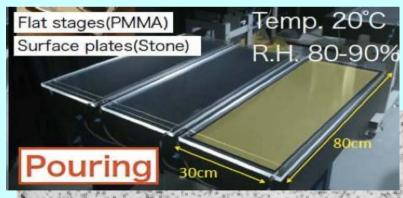
on behalf of the NINJA Collaboration and the EMPHATIC Collaboration





Latest high speed scanning system → 4.700 cm<sup>2</sup>/hour (Nagova Univ.)



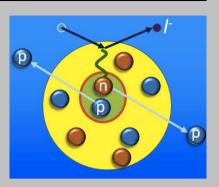


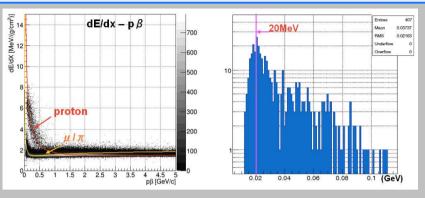
We have developed the emulsion technology beyond DONUT and OPERA!!

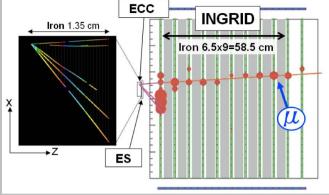
A neutrino interaction in emulsion @J-PARC



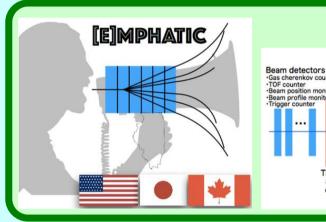
## Neutrino Interaction research with Nuclear emulsion and J-PARC Accelerator







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 FY2017 Emulsion Wire Threshold aerogel 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 v CPV!!  $\overline{v}_{\mu}$   $\overline{v}_{\mu}$