FJPPL Report 2025

Fiscal year April 1st 2025 – March 31th 2026

Please replace the red examples by the appropriate data in black

ID: NU_09	Title:Characterization of the upgraded J-PARC neutrino beam for T2K-II and HK experiments

Project Leader	French Group				Japanese Group			
	name	email	title	lab	name	email	title	lab
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Spending on French Funds

Description	€/unit	Nb of units	Total (€)	Provided by:[1]
Visit to Japan	150/day	10 days	1500	IN2P3
Travel	1000	1 travel	1000	IN2P3
Total			2500	

Spending on KEK Fund

Description	k¥/Unit	Nb of units	Total (k¥)	Provided by:[1]
Visit to France	20/day	10 days	200	KEK
Travel	150	1 travel	150	KEK
Total			350	

Additional spending on French funds			Additional spending on Japan funds		
Provided by:[2]	Type	€	Provided by:[3]	Type	k¥
Total			Total		

[1] IN2P3, Irfu or KEK. [2] French Embassy, other CNRS or CEA programs, PICS, European grants…. [3] JSPS, RIKEN, Universities …

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Summary of 2025 Activities	In 2025 we continued our very successful joint France-Japan project with the main goal of improving our knowledge on the upgraded (anti)neutrino beam produced at J-PARC for T2K-II and HyperKamiokande (HK) experiments. After the important J-PARC neutrino beamline upgrade, it now operates regularly achieving the record beam power of 900 kW. Moreover, operation with a horn current set at 320 kA (instead of 250 kA used previously) is now well established. In 2025, the physics data taking using upgraded beamline and neutrino detectors was successfully performed. The measurements of hadron yields from the surface of the T2K target performed with the upgraded NA61/SHINE spectrometer at the CERN SPS are crucial for detailed characterization of the J-PARC neutrino beam and already allowed to achieve unprecedented precision on flux uncertainties. New data (180 M triggers compared to 10 M used previously) collected during the 2022 are being thoroughly calibrated and analyzed by a joint team of Japanese and French physicists. In 2025 the first round of calibration was finalized and the first preliminary analysis was performed in order to measure the yields of neutral kaons. These results, included in the PhD thesis by Sakiko Nishimori, together with future measurements of charged kaon yields are crucial for further reduction of neutrino flux uncertainties in T2K and HK. In 2025 we started the production and deployment of the new time synchronization system being developed for the J-PARC neutrino beam by the joint French-Japanese team. Some stability tests were performed on the J-PARC site using the already installed equipment. A free-running Rubidium atomic clock accompanied by a set of GNSS antenna and receiver installed at J-PARC are being characterized. Additionally, during T2K experiment data taking, we are conducting measurement tests using the new time synchronization system to evaluate its measurement stability and other functions. A correction method was developed to precisely synchronize a time base generated from a free-running atomic clock with the Coordinated Universal Time (UTC) using signals from a GNSS antenna and receiver. In 2025, new results on the updated HK sensitivity studies to the neutrino oscillation parameters using the neutrino beam from the J-PARC accelerator were obtained and published. One of the main analyzers was Claire Dalmazzone (LPNHE) who successfully defended her PhD thesis in September, 2025.
Workshop / satellite session at annual workshop	The group meets regularly on the occasion of NA61/SHINE, T2K and HK collaboration meetings. We also organize dedicated Zoom meetings in order to discuss the ongoing activities and to define plans for the future. In-person workshops are also being scheduled, if needed.

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Articles, conference talks & posters related to the TYL project	T2K and NOvA Collaborations, Joint neutrino oscillation analysis from the T2K and NOvA experiments, *Nature* 646 (2025) 8086, 818-824K. Abe et al., T2K Collaboration, Results from the T2K Experiment on Neutrino Mixing Including a New Far Detector μ-like Sample, *Phys.Rev.Lett.* 135 (2025) 26, 261801 H. Adhikary et al., NA61/SHINE Collaboration, Measurements of hadron production in proton-carbon interactions, *Phys.Rev.D* 112 (2025) 1, 012011 Claire Dalmazzone et al., Precise synchronization of a free-running Rubidium atomic clock with GPS Time for applications in experimental particle physics, *Nucl.Instrum.Meth.A* 1075 (2025) 170358 Claire Dalmazzone et al., Real time synchronisation of a free-running atomic clock time base with UTC using GNSS signals for application in experimental physics, e-Print: 2511.05525 [physics.atom-ph], submitted to NIM A Abe et al., Hyper-Kamiokande Collaboration, Sensitivity of the Hyper-Kamiokande experiment to neutrino oscillation parameters using accelerator neutrinos, e-Print: 2505.15019 [hep-ex], accepted for publication in EPJ C
Jointly Supervised Students	