# FJPPL (TYL) application 2025

*Fiscal year April 1st 2025 – March 31th 2026*

***Please replace the red examples by the appropriate data in black***

| ID[1]: NU_09 | Title: Characterization of the upgraded J-PARC neutrino beam for T2K-II and HK experiments |
|---|---|

| | French Group | | | Japanese Group | | |
|---|---|---|---|---|---|---|
| | **name** (Family name, First name) | **title** | **lab.[2]** | **name** (Family name, First name) | **title** | **lab.[2]** |
| **PIs:** | Popov Boris<br>e-mail: popov@lpnhe.in2p3.fr | Dr | LPNHE | Sakashita Ken<br>e-mail: kensh@post.kek.jp | Prof | KEK |
| **Members:** | Dalmazzone Claire | PhD | LPNHE | Nakadaira Takeshi | Prof | KEK |
| | Guigue Mathieu | Dr | LPNHE | Nishimori Sakiko | PhD | KEK |
| | Restrepo Lorenzo | PhD | LPNHE | Friend Megan | Prof | KEK |
| | Russo Stefano | Dr | LPNHE | Koshio Yusuke | Prof | Okayama Univ |
| | Voisin Vincent | | LPNHE | Shiraishi Yuki | PhD | Okayama Univ |

**Funding Request from France**

| Description | €/unit | nb of units | total (€) | requested to[3] |
|---|---|---|---|---|
| Visit to Japan | 100/day | 20 days | 2000 | IN2P3 |
| Travel | 1000 | 2 travel | 2000 | IN2P3 |
| | | | | |
| | | | | |
| Total | | | 4000 | |

**Funding Request from Japan**

| Description | k¥/Unit | nb of units | total (k¥) | requested to[3] |
|---|---|---|---|---|
| Visit to France | 20/day | 20 days | 400 | KEK |
| Travel | 150 | 2 travels | 300 | KEK |
| | | | | |
| Total | | | 700 | |

| Additional Funding from France | | | Additional Funding from Japan | | |
|---|---|---|---|---|---|
| **provided by/requested to[4]** | **Type** | **€** | **provided by/requested to[4]** | **Type** | **k¥** |
| IN2P3 AP | travel | 10000 | | | |
| | | | | | |
| Total | | 10000 | Total | | |

[1] ID: If program continuation, use previous ID; if new project, ID will be set by the TYL directors;

[2] e.g. LAPP/IN2P3, Irfu/CEA, IPNS/KEK, etc.

[3] IN2P3, Irfu or KEK

[4] e.g. French Embassy, other CNRS or CEA programs, PICS, European grants, JSPS, RIKEN, Universities ….;

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|---|---|
| **Summary Of 2025 Project** | In 2025 we will continue 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 800 kW. Moreover, operation with a horn current set at 320 kA (instead of 250 kA used previously) is now well established. In 2025, we will continue physics data taking using upgraded beamline and neutrino detectors.<br><br>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 we plan to finalize the calibration and to perform the analysis in order to study the cross-sections for the production of neutral kaons and charged kaons with high momentum, aiming to reduce neutrino flux errors in T2K.<br><br>In 2025 we also plan to finalize the design and to start 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 will be 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 will be characterized and maintained.<br><br>In 2025 we also plan to publish the new results on the updated HyperKamiokande sensitivity studies to the neutrino oscillation parameters using the neutrino beam from the J-PARC accelerator. |
| **Satellite meeting 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. |
| **Articles, conference talks & posters related to the TYL project** | **Precise synchronization of a free-running Rubidium atomic clock with GPS Time for applications in experimental particle physics,** Claire Dalmazzone, Lucile Mellet, Mathieu Guigue, Boris Popov, Stefano Russo,Vincent Voisin, 2024, e-Print: **2407.20825 [physics.ins-det]**<br>**First Joint Oscillation Analysis of Super-Kamiokande Atmospheric and T2K Accelerator Neutrino Data,** T2K and SK Collaborations, K.Abe et al, 2023, *Phys.Rev.Lett.* 134 (2025) 1, 011801; DOI: **10.1103/PhysRevLett.134.011801**<br>**KS0 meson production in inelastic p+p interactions at 31, 40 and 80 GeV/c beam momentum measured by NA61/SHINE at the CERN SPS,** NA61/SHINE Collaboration, N.Abgrall et al, 2024, *Eur.Phys.J. C* 84 (2024) 8, 820; DOI:10.1140/epjc/s10052-024-13056-2<br>**NA61/SHINE experiment at the CERN SPS,** C.Dalmazzone (for NA61/SHINE collaboration), talk at the J-PARC symposium, October 2024 |

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|---|---|
| **Jointly Supervised Students** | |
| **Comment related to IRL TYL & ILANCE** | |