# 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 | Hino Yota | Dr | KEK |
| | Voisin Vincent | | LPNHE | Koshio Yusuke | Prof | Okayama Univ |
| | Giganti Claudio | Dr | 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 | **JSPS** | **travel** | **140** |
| | | | | | |
| 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. Additionally, during T2K experiment data taking, we will conduct measurement tests using the new time synchronization system to evaluate its measurement stability and other functions.<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], to appear in NIM A**<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** | |