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Dear Colleague,

This is a recommendation letter in support of the application of **Cédric Weiland** for a post-doctoral position in theoretical high-energy physics in your group.

Cédric Weiland is in the third year of his Ph.D. studies in the doctoral school associated to the University of Paris-Sud 11, under my supervision. His Ph.D. thesis is devoted to the search of new physics signatures by studying observables both at high and low energies. More specifically, he works on Lepton Flavour Violation, CP Violation and Collider Signals, focusing on the complementarity of direct and indirect searches of new physics.

Cédric is a former student of the “École Normale Supérieure-Lyon”. During his “Master 1” internship, he worked on “SuperB potential to discover Lepton Flavour Violation with the decay  $\tau \rightarrow \mu\mu\mu$ ” under the supervision of Dr. Adrian Bevan at the Particle Physics Research Center, Queen Mary, University of London. His work has been published in the “SuperB Progress Reports - Physics” (arXiv:1008.1541).

Since this topic interested him very much, Cédric applied for an “M2” internship under my supervision at the Laboratoire de Physique Théorique (LPT) of Orsay. Cédric did an excellent job during his four month internship: in addition to following the “École doctorale - Particules - Noyaux - Cosmos - ED 517” (several series of advanced lectures), he started a very complete research project focusing on the “Inverse Seesaw mechanism”. This led to an excellent Master thesis, which was most successfully defended. At the end of this internship he expressed the willingness to pursue this line of research, and continue to develop this topic in a Ph.D. thesis, under my supervision.

In the first stages of his Ph.D., and as a direct continuation of his Master studies, he implemented the inverse seesaw mechanism in the framework of the Next to Minimal Supersymmetric Standard Model (NMSSM). This idea aimed at fulfilling the twin purpose of generating neutrino masses via the inverse seesaw mechanism while keeping the option of a very light pseudoscalar experimentally viable (by opening dominant invisible decay channels of the pseudoscalar which help evading the existing bounds). This work led Cédric to study in detail several different topics, both theoretical (supersymmetric models, neutrino mass generation) and experimental (from collider searches to low-energy observables). This work has been published in Phys.Lett. B700 (2011) 351 (arXiv:1011.5037).

Along the same lines, he has been working on Higgs-mediated processes, studying the impact of a minimal supersymmetric inverse seesaw on several low-energy flavour violation

observables such as  $\tau \rightarrow \mu\mu\mu$ . Due to having an inverse seesaw, the contribution of the right-handed sneutrinos significantly enhances the Higgs-mediated penguin diagrams. He has also analysed in great detail the impact of the Higgs-mediated processes regarding leptonic  $B$ -meson and Higgs decays, leading to a complete work that appeared in JHEP 1203 (2012) 100 (arXiv:1205.6400).

More recently, he was actively invested in the study of a peculiar feature of the minimal supersymmetric inverse seesaw: the non-minimal particle content of the model opens the door to dominant Z-penguin contributions to three-body and semileptonic lepton decays as well as neutrinoless conversion in muonic atoms. Interestingly the contribution from the Z-penguins exhibits a non-decoupling behaviour making it quite insensible to the right-handed neutrino mass and the supersymmetric scale. This work has been published JHEP 1209 (2012) 015 (arXiv:1206.6497).

At present, Cédric is involved in two projects. He is currently investigating how the ratio of kaons decaying leptonically to a muon or an electron can be modified in the Inverse seesaw, while concluding a project on the Scherk-Schwarz mechanism, in collaboration with H. Murayama and members of his team at the IPMU (in the framework of JSPS Summer program 2012).

From the beginning of his Ph.D., Cédric Weiland displayed a rapid comprehension of the problems he encountered, which enabled him to master the topics of neutrino physics and lepton flavour violation. During his thesis he put forward new original ideas, finding new ways to progress, both concerning technical methods of solving problems, and finding new aspects of them. During the past three years, I could closely observe his rapid evolution from a shy undergraduate student to a confident dedicated hard working young researcher.

In the laboratory life, he has always strongly interacted with everyone (not only with his fellow Ph.D. students but also with postdocs and staff), and participates very actively in all the scientific activities of the laboratory (journal clubs, seminars, ...). He has an excellent work ethic, always present, extremely focused in his work and open to discussions. In spite of his young age, I find him extremely competent: he masters several theoretical topics and aims towards the goal of being autonomous and independent.

Cédric had the opportunity to attend several scientific meetings where he presented his research work and results. His presentations and posters are very clear, well organised and pedagogical, as you will learn if you have the possibility of inviting him for a interview/seminar.

In summary, I find Cédric Weiland an excellent Ph.D. student, and certainly a most deserving candidate for a postdoctoral fellowship in Your Institute.

I most strongly recommend his application. Do not hesitate to contact me directly - I would be very happy to support Cédric's application.

Cordially yours,

Prof. Asmaa Abada