**ENS / IISER collaboration**

***Internship subject form***

To be sent back by January 31st, 2020

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| Name of the institution | Ecole normale supérieure Paris-Saclay |
| Name of the host laboratory | LUMIN (FRE 2036) |
| Website of the host laboratory | Under construction |
| Research group | Lasers and Optics |
| Internship number | PHYS 4 |
| Internship subject (title) | Squeezing the quantum fluctuations of vacuum in metastable helium atoms |
| Prerequisites | Quantum physics, optics |
| Internship proposal: description and expected training outcomes (15 lines max.) | A quantum description of light implies that the quadratures of the field in a given mode exhibit fluctuations governed by Heisenberg inequalities. A laser typically emits a so-called quasi-classical state, which saturates these inequalities and for which the two quadratures have identical variances. In our experiment in Orsay, we have been able to obtain a very good phase sensitive amplification using four-wave mixing phenomena associated with coherent population trapping in a vapour of metastable helium atoms at room temperature. The aim of this internship will be to investigate the possibility to obtain squeezed vacuum states of light using this setup.  [1] P. Neveu et al., New Journal of Physics **20**, 083043 (2018) - <https://doi.org/10.1088/1367-2630/aadb79> |