PhD and Post-doc positions

are available in experimental AMO physics within the research program:

The mysterious size of the proton
- a search for new physics with the proton radius puzzle -

The aim of the FOM/NWO-funded research program is to perform highly advanced precision spectroscopy in four different systems (H\textsubscript{2}, HD\textsuperscript{+}, He\textsuperscript{+} and He) to investigate the Proton Radius Puzzle. This puzzle emerged in 2010 [1] from precision spectroscopy in normal (electronic) hydrogen and muonic hydrogen (where the electron is replaced with a muon). The finite size of the proton causes small energy shifts in the spectrum, so the proton size can be determined by precision spectroscopy. However, the proton size obtained from electronic and muonic hydrogen differ by 4% (>6 standard deviations) which is still a mystery. With our research program we want to obtain new values for the nuclear sizes of the proton, deuteron, alpha and helion particle at the attometer (10\textsuperscript{-18} m) level. A comparison with results from muonic systems could unravel the puzzle, and also enable new tests of e.g. Quantum Electrodynamics. For this challenge we have a state of the art infrastructure, such as frequency comb lasers, an ultrastable laser (linewidth < 1 Hz), a Cs atomic clock, and e.g. different forms of particle traps (ion traps, neutral atom traps). The four projects for which we are hiring are:

**Project A1 (PhD/Postdoc): Femtosecond XUV laser spectroscopy of He\textsuperscript{+} (1S-2S) in an ion trap**
Contact: Kjeld Eikema, k.s.e.eikema@vu.nl

**Project B (Postdoc): Two-photon spectroscopy of HD\textsuperscript{+} in an ion trap**
Contact: Jeroen Koelemeij, j.c.j.koelemeij@vu.nl

**Project C (PhD): VUV laser spectroscopy of H\textsubscript{2} (GK-X) in a molecular beam**
Contact: Wim Ubachs, w.m.g.ubachs@vu.nl

**Project D (PhD & Postdoc): Laser spectroscopy of ultracold He in an optical trap**
Contact: Wim Vassen, w.vassen@vu.nl

Admission as a PhD student (4-year position) is possible with a MSc Physics (or comparable) degree. Experience in experimental physics, preferentially atomic or molecular physics, is useful. For more info on the research group and the positions at LaserLaB Vrije Universiteit Amsterdam see [www.nat.vu.nl/en/research/atoms_molecules_lasers](http://www.nat.vu.nl/en/research/atoms_molecules_lasers)

You can send your application or questions by email to the PI’s of the projects. Please include a letter of motivation, a CV and two persons (email addresses) we can contact for a reference.