Postdoc position: Angle-resolved photoemission spectroscopy studies of quasiparticle destruction on approach to the Mott insulating state in strange metals.

Research The *Correlated Electron Systems* group at Radboud University (RU) and the *Quantum Materials* group at the Van der Waals-Zeeman Institute, part of the University of Amsterdam's Institute of Physics work together on materials – the high-T_c cuprates – that are characterized by strong correlations and low dimensionality. This novel class of materials exhibit strange metallic behaviour, as well as high-temperature superconductivity. This behaviour is a problem that has challenged the research community for over three decades and is oft regarded as one of the major unsolved problems in condensed matter physics. But in order to understand what causes the electrons to pair and condense into the superconducting state, one must first understand the normal (metallic) state from which the electrons undergo pair condensation. This project aims at bringing us a step closer to that understanding.

Job description Angle-resolved photoemission spectroscopy (ARPES) is a powerful probe of the electronic state in many-body systems as it provides a window on both the electronic band structure and interaction effects with explicit resolution in momentum space. In this project, ARPES will be used to follow the evolution of the quasiparticle peak in the spectral function, a signature of coherence, with temperature and doping across the strange metal regime of high-T_c cuprates in order to explore how quasiparticle integrity is lost as carrier density is reduced. The data gathered will be combined with experimental results from low-temperature, high-field transport, STM/STS and optical conductivity from the same sets of crystals, thereby embedding the ARPES data in a wider experimental programme, which also includes theory. This strange metal region of phase space has not been investigated anywhere near as intensively as others – perhaps due to a lack of recognition of its own, curious nature. Through this 'back-door' approach, a deeper understanding of how systems evolve from a correlated Fermi liquid to a Mott insulator will be gained. ARPES measurements will focus on the normal state of single-layered cuprates such as $(Bi,Pb)_2(Sr,La)_2CuO_{6+\delta}$, following the evolution of the low energy electronic states at different locations along the Fermi surface as a function of temperature and doping.

Location The postdoc will be stationed at the ARPES lab in the QMat group at the UvA, but will spend periods (up to two weeks at a time) at various synchrotron facilities around Europe such as Diamond Light Source, the Swiss Light Source and SOLEIL (outside Paris), with occasional trips to Radboud University in Nijmegen and the University of Bristol (UoB) to engage with the wider research group. This project forms part of 2 ongoing grants – a consortium grant within the Netherlands (which brings together four experimental and two theoretical groups spanning Nijmegen, Amsterdam, Leiden and Utrecht), and a European Research Council Advanced grant held by Prof. Hussey at both RU and the UoB. The in-house ARPES spectrometer at UvA has recently undergone a major upgrade and combines a new hemispherical analyser (MBS-A1) with a new VUV source and monochromator (MBS-L1 + SPECS monochromator; with microfocussing optics on order) as well as a new UV laser system for 5.9-6.4eV (APE). This facility enables acquisition of very high quality ARPES data across a wide range of temperatures, and forms an ideal experimental coupling with the intensive but briefer synchrotron campaigns.

Requirements We seek candidates with a strong background in experimental physics who are motivated to work on a challenging and internationally competitive research topic. You should have completed a PhD, or be about to submit your PhD thesis. Experience in preferably both laser and synchrotron ARPES is essential: experience working with correlated electrons systems is appreciated. You should have strong communication skills, including fluency in written and spoken English and we expect you to contribute to the daily supervision of PhD students associated with these projects, as well as to lead the beamtime application process and planning and execution of beamtimes.

Both the RU/HFML and QMat groups are strongly committed to diversity within its community and especially welcomes applications from members of underrepresented groups.

Conditions of employment Although you will be working in Amsterdam at the UvA, you will be employed by the Radboud University in Nijmegen for a fixed period of two years. Your monthly salary will be in the range € 3353 - €4402 depending on your level of experience), supplemented with a holiday allowance of 8 percent and an end-of-year bonus of 8.33 percent. The conditions of employment are laid down in the Collective Labour Agreement for Research Centres (CAO-Onderzoekinstellingen), more exclusive information is available at this website under Personeelsinformatie (in Dutch) or under Personnel (in English). General information about working for the RU can be found in the English part of this website under Personnel.

Contact For further information about this position please contact Prof. dr. Nigel Hussey or Prof. dr. Mark Golden

Website http://www.ru.nl/hfml or http://quantummaterials.nl

Applications You can only respond to this vacancy online via the button below.
Please include a brief curriculum vitae, including a publication list, and a cover letter stating your motivation and eligibility for the post and the names of two academic referees. Short-listed candidates will be invited for an interview.

Closing time The deadline for applications is 14 August 2020, but be aware that the selection procedure commences immediately, and the position will be filled as soon as an excellent candidate has been found.