Institute of Energy and Climate Research (IEK), Forschungszentrum Jülich GmbH,

invites to the **COLLOQUIUM:**

"Plasma spectral diagnostics for applications in fusion, astrophysical, and low temperature laboratory environments"

given by

Dr. Prof. Stuart Loch,
Auburn University, AL, USA

Time and place:
Wed, 12th Dec 2018, 11:00,
Main auditorium in the FZJ central library ("Zentralbibliotek"),
http://www.fz-juelich.de/portal/EN/Service/Howtoreachus/_node.html
In case of any questions related to the event, please, contact
Dr. Dmitriy Borodin, d.borodin@fz-juelich.de

Abstract.

Plasma spectral diagnostics based upon high quality atomic data and generalized collisional-radiative (GCR) theory [1] have found wide applications in both laboratory and astrophysical research. Three case studies will be presented to highlight recent advances in the capabilities for accurate plasma spectral diagnostics. The first will center on the need to accurately diagnose erosion rates from high-Z plasma facing components on tokamak experiments. New atomic data for tungsten [2] and molybdenum [3], combined with Ultraviolet spectroscopic measurements, are expected to improve the accuracy of gross and net erosion measurements for tokamaks. In the second case study, a review is given of a relatively new area of plasma spectroscopy, namely the generation of uncertainties on atomic data and their use in spectral diagnostics [4]. Examples will be given using astrophysical spectral diagnostics using an uncertainty analysis, with a focus on correlation effects. In the third case study, the importance will be shown of determining long-lived metastable populations in diagnostics of low temperature laboratory plasmas. While the problem of metastable states is important for a wide range of plasma applications, the problem is particularly pronounced for low temperature laboratory plasmas such as those used for applications in medical physics research, plasma thrusters, and dusty plasmas. All three case studies will be analyzed using the ADAS database and modeling codes [1,5], along with newly developed codes. The work is built upon the framework and methodologies developed by Prof. Hugh Summers and the ADAS consortium.

[1] H.P. Summers et al., Plasma Physics and Controlled Fusion, **48**, 263 (2006)
[2] R. T. Smyth, C.P. Ballance, C.A. Ramsbottom, C.A. Johnson, D.A. Ennis, and S.D. Loch, Phys. Rev. A, **97**, 052705 (2018)
[3] R. T. Smyth, C.A. Johnson, D.A. Ennis, S.D. Loch, C.A. Ramsbottom, and C.P. Ballance, Phys. Rev. A, **96**, 042713 (2017)
[4] S.D. Loch, M.S. Pindzola, C.P. Ballance, M. Witthoeft, A. Foster, R. Smith, and M.G. O'Mullane, ICAMDATA-2012, AIP Conference Proceedings, **1545**, 242 (2013)
[5] *www.adas.ac.uk*