Date: Wednesday, June 24, 2015
Time: 11:00 – 12:00
Venue: Meeting Room C016, Lab 1, Level C

Speaker: **Hans Blom, Associate Professor**
Affiliation: **The Royal Institute of Technology, Sweden**

Title: Super-resolution imaging in neuroscience and nephrology

Abstract:

With the help of several superresolution fluorescence microscopy modalities (STED and PALM), we have resolved the distribution of postsynaptic proteins in dendritic spines. The dissected topology has opened up a new perspective to elucidate the nature of the physiological function. We have in these investigations especially focused on estimates of the protein amount dissected with the different superresolution modalities, which thus allows assessments of how variations depending on labeling strategies, sample analysis and choice of nanoscopic imaging method; concluding that all may be critical factors for correct molecular quantification at the nanoscale [1,2,3,4]. Furthermore, we set the goal to implement a simple volumetric sample preparation protocol to study the filtration barrier structures in the kidney using immunofluorescence. Lately, several optical clearing methods have been presented, making it possible to image large pieces of tissue and whole organs using light microscopy. In our study, we found that hydrogel-based optical clearing is a beneficial tool when studying the finest renal tissue morphology at the nanometer-scale. When imaging samples using super-resolution STED microscopy, superb staining (low background, homogeneous signal) is crucial to be able to extract correct information from the resulting nanoscale image. We show that signal-to-noise ratio and the generated immunosignal homogeneity are both increased in optically cleared tissue. These findings open up for super-resolution light microscopy studies of slit diaphragms in fluorescently labelled intact kidney samples, which adds an important tool in studying glomerular filtration function.

[1] Blom et al. *BMC Neuroscience* 2011, 12:16; [2] Blom et al. *Microscopy Research and Technique* 2012, 75:220; [3] Blom et al *PLoS One* 2013, 8:e75155; [4] Liebmann et al *Optical Nanoscopy* 2013, 2:6.

Bio:

I obtained my M.Sc. in Engineering Physics from the Uppsala University, Sweden, in 1998, including studies at the Norwegian Technical University, Trondheim (94/95), the University of Bonn, Germany (96/97), and Yokohama National University in Japan (Master Thesis 97/98). I obtained my Ph.D. from the Royal Institute of Technology (KTH) in biophotonics in 2003, a collaboration with the Medical Physics group at Karolinska Institutet (98/03). Simultanously I also worked as a research engineer at Olympus Optical Ltd in Tokoy, Japan (2002). Between 2003-2005 I did a postdoc in Professor Stefan W. Hell's group at the Max-Planck-Institute for Biophysical Chemistry in Göttingen to develop super-resolution microscopy for single molecule analysis. Currently I am an Associate Professor at KTH doing research in super-resolution imaging and its applications in life sciences, and working as Facility manager at the national bioscience hub Science for Life laboratory in Stockholm to support scientist in need of the technique.