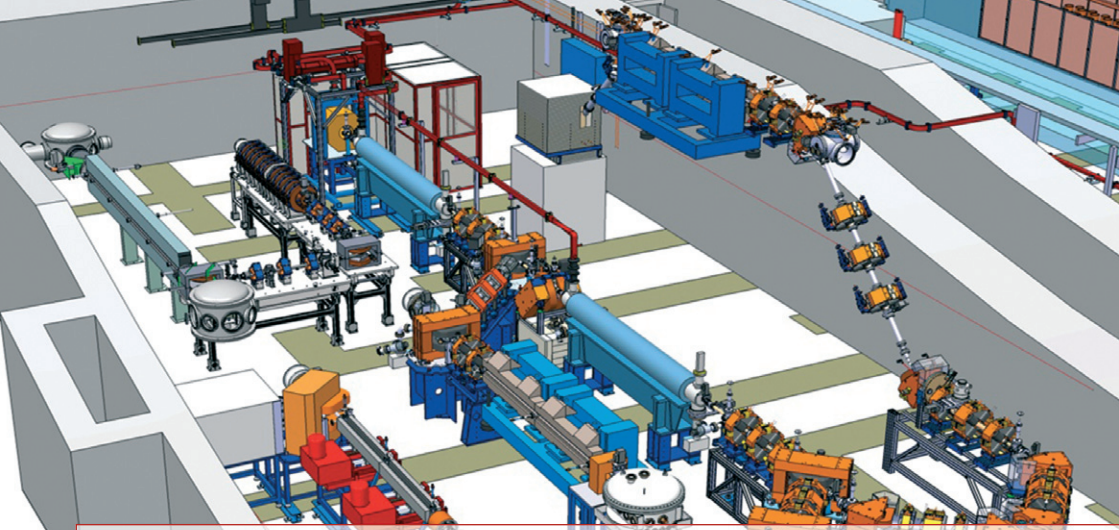

37th Meeting of the section

Atomic Molecular and Optical Physics (AMO)

Program and abstracts

October 1 and 2 2013

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FOM

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Conference coordination:
Erna Gouwens (RU)

P51
Laser-cooled atomic beam ion source

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A new type of high-brightness ion source is under development which employs transverse laser cooling and compression of a thermal atomic rubidium beam, followed by in-field photo-ionization. When attached to a focusing column, this Focused Ion Beam (FIB) has the advantage of supplying a higher current in a smaller spot compared to conventional LMIS-based FIBs, thus increasing both the resolution and the speed of the FIB.
Simulations using a 5 cm long laser cooling and compression stage and a realistic ionization and acceleration structure, predict an achievable brightness for $^{85}Rb^{+}$ of order 10^{7} A/m^{2} sr eV at an energy spread of less than 1 eV and a current of tens of pA. This would lead to a spot size below 5 nm.
Experimental progress on the efficient high-flux atom source and the 2D laser cooler and compressor will be reported.

P52
Employment of plasmonic field enhancement by silver nanoshells for increasing the absorption cross section of ruthenium-based chromophores

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Metal nanospheres have the potential to show strong field enhancements at the surface, to which light-absorbing molecular complexes can be attached. Structures consisting of a dielectric core coated with a metal shell (referred to as 'nanoshells') can in theory show even stronger field enhancements.

The objective of the current research is to enhance the absorption cross section of a ruthenium chromophore, commonly used in photovoltaics and photocatalysis, by placing it in the vicinity of silver nanospheres or -shells. We performed FDTD simulations on dielectric core – metal shell – dielectric shell particles. The outer dielectric shell serves as a spacing layer to prevent undesirable quenching and to ensure electrostatic attachment between the antenna and the chromophore complexes. Steady-state and time-resolved fluorescence measurements were performed on chromophores attached to nano-antennas of this design and of varying dimensions in solution, to investigate the influence of the nano-antennas on both fluorescence intensity and fluorescence lifetime. We attempt to match the enhancement of the local electric field with the chromophores absorption spectrum.