

# Interaction of HCI with surfaces

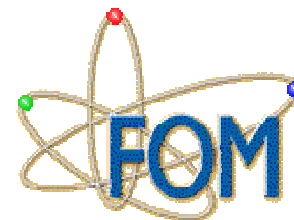
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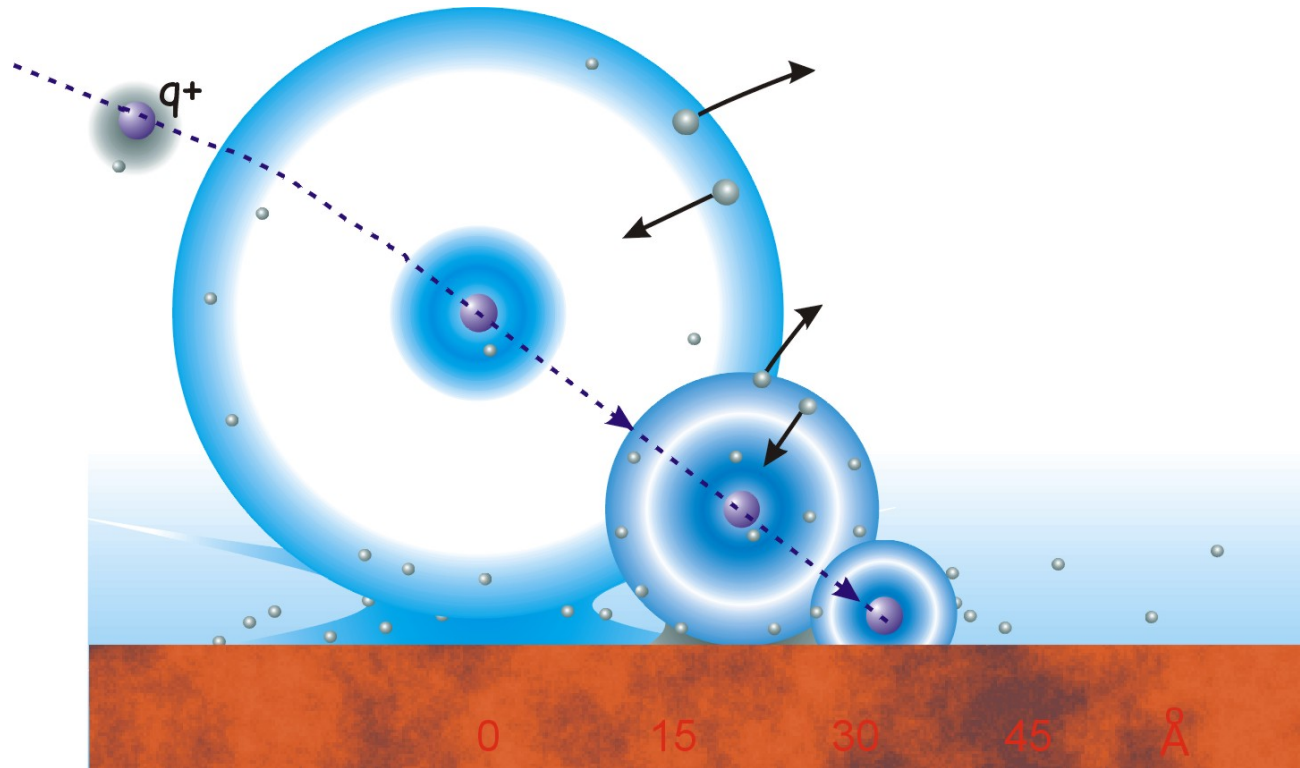
Atomic Physics



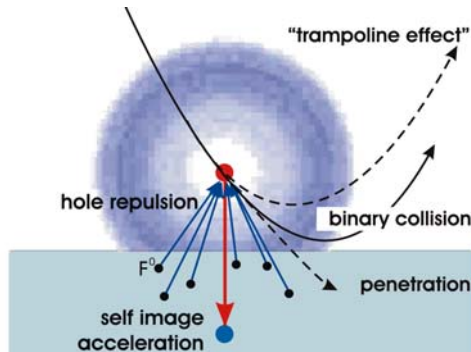
Groningen, NL



# general picture of the interaction



# Research topics for HITRAP



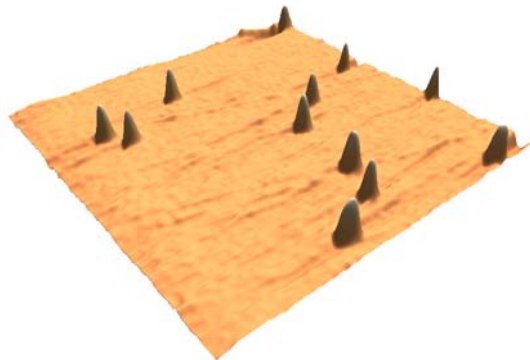
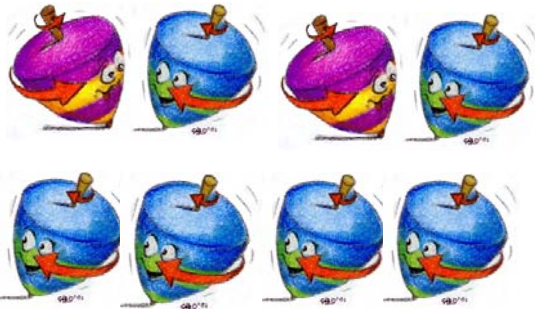
*TRAMPOLINE effect  
on insulators*

*surface electronic structure*

*the fs multi-electron dynamics*

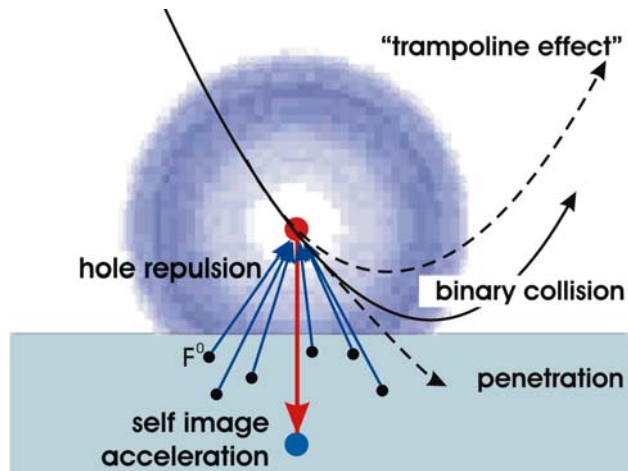
*Exotic, spin-polarized hollow atoms*

*Magnetized surfaces*



*Surface lithography*

## TRAMPOLINE effect on insulators



*Self-induced back-scattering of HCI by the charge built up at the surface*

*Occurrence claimed on basis of X-ray spectral changes (Briand et al)*

*Theory: no TRAMPOLINE effect  $q < 20+$*

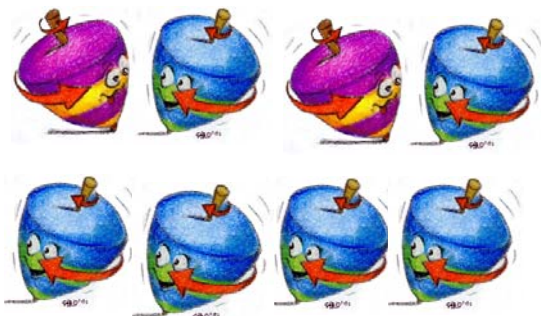
*Electron / X-ray spectra - How do they change???*

*Scattered ions - Charge states, scattering angles and energies???*

*Initial HCI energy: 0 eV*

*Electron / X-ray spectra - Statistics (beam + detector)*

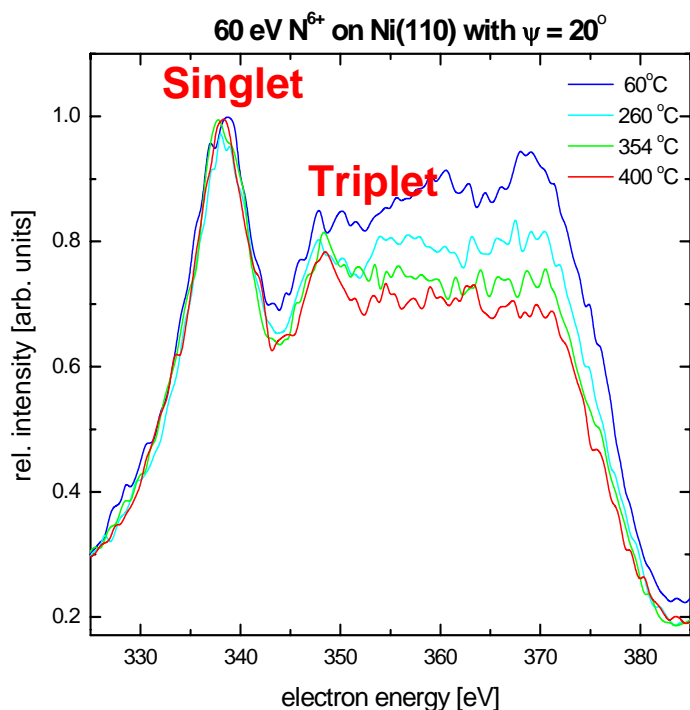
# Exotic, spin-polarized hollow atoms magnetized surfaces



*Production of high-spin states by capture from magnetised surfaces*

*Occurrence observed in  $\text{He}^{2+}$  /  $\text{N}^{6+}$*

*Theory: capture of electrons near Fermi edge*



*High-energy electron / X-ray spectra - Effects washed out???*

*Low-energy electron spectra-*

*Is the info there???*

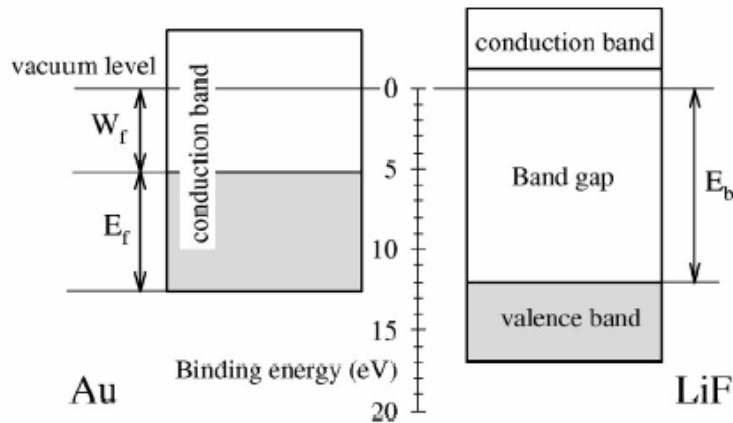
*resolution / stray B fields???*

*Transient recording*

*Initial HCI energy: < 1000 eV*

*Statistics (beam + detector)*

## THIN FILMS: another option?



*Electron spectra Au and LiF differ*  
*Total electron yields different*  
*Xe50+ Au: 170 LiF: 250 (Meissl et al)*  
*KLL-spectra of 1 ML LiF on Au*  
*similar to pure LiF*

### *Electron statistics*

*Insulators vs. Metals, (self-assembled) biomolecular layers*

*Spectral changes ???*

*Initial HCI energy: not too restrictive for statistics*

*Electron / X-ray spectra - Statistics (beam + detector)*

# Summary

## Research topic

*Influence of the surface electronic structure on  
the fs multi-electron dynamics in hollow atoms*

*TRAMPOLINE effect*

*Exotic, spin-polarized hollow atoms*

*THIN FILMS*

*Surface lithography*

*Experimental issues:*

*Deceleration systems*

*Spectral intensities*

*Thin film preparation/characterization*

*In situ AFM/STM microscopy*