

EARLY STAGE RESEARCHER

## Christina-Anastasia Alexandridi

PROJECT: *Ultrafast Ionization Dynamics studied by Photoionization Spectroscopy and High Harmonic Spectroscopy*

Host institution: CEA  
Thesis director: Pascal Salieres  
Start date: 01/10/2015



University Of Crete



Master Thesis:

“Development of Terahertz Profilometry Imaging: Application in moisture profilometry”

Prof. S. Tzortzakis  
(2013-2015)

# Outline

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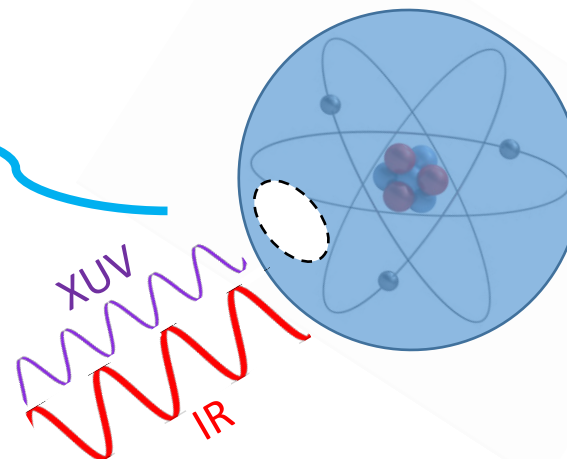
- Scientific scope of the project and goals
- Scientific activities and achieved goals
- Other activities
- Future work

SCIENTIFIC SCOPE OF THE PROJECT AND GOALS

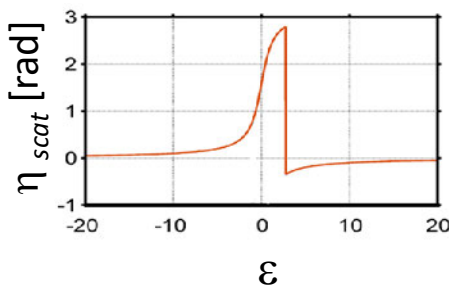
“Ultrafast Ionization Dynamics  
studied by Photoionization Spectroscopy and High Harmonic Spectroscopy”

wavepacket dynamics ← Ionization time delays → Hole dynamics

$$\tau^{\text{scat}} \approx \frac{\partial \eta_{\text{scat}}}{\partial \omega}$$



→ Ionization dynamics close to a resonance ?



Measurement technique:

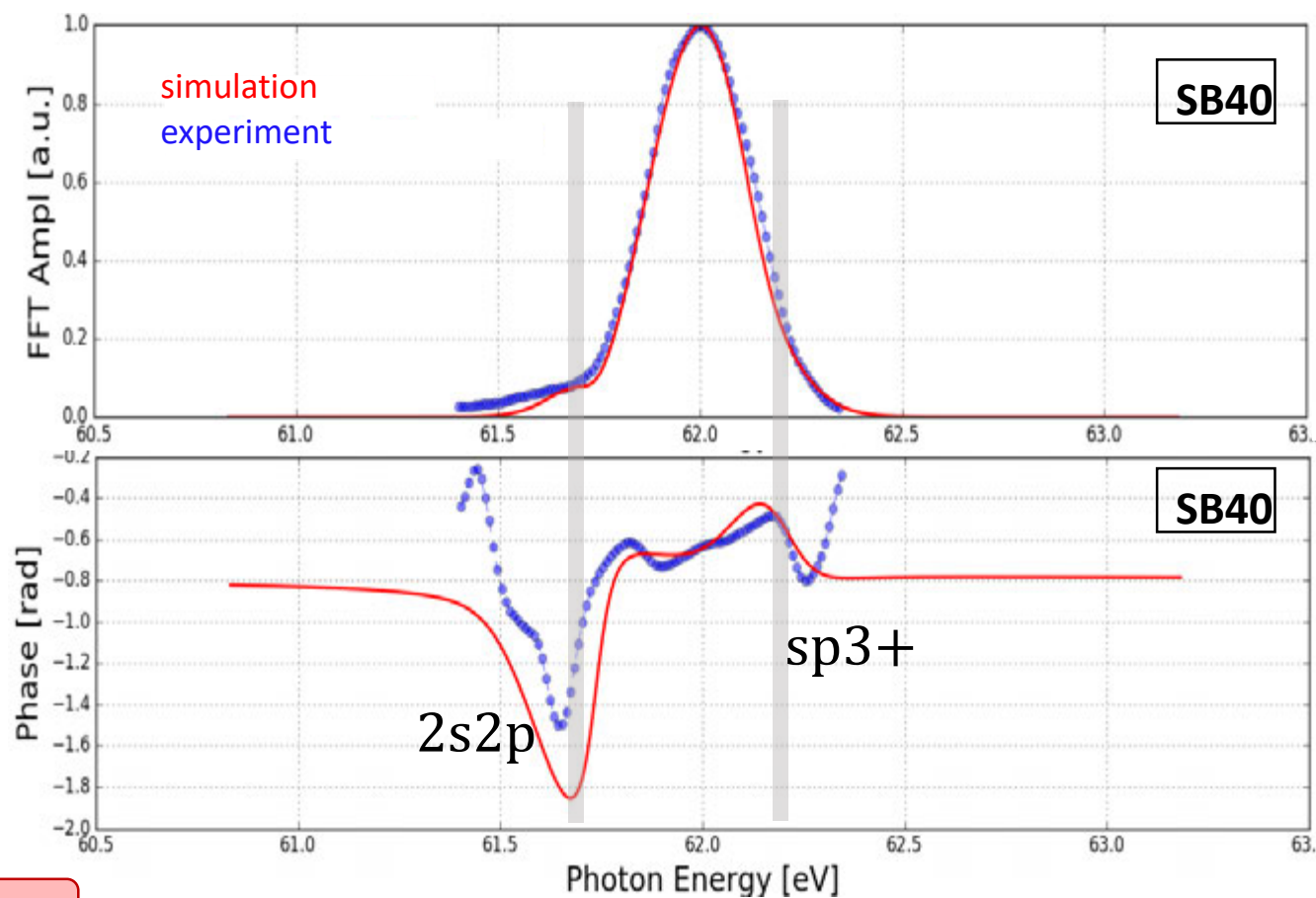
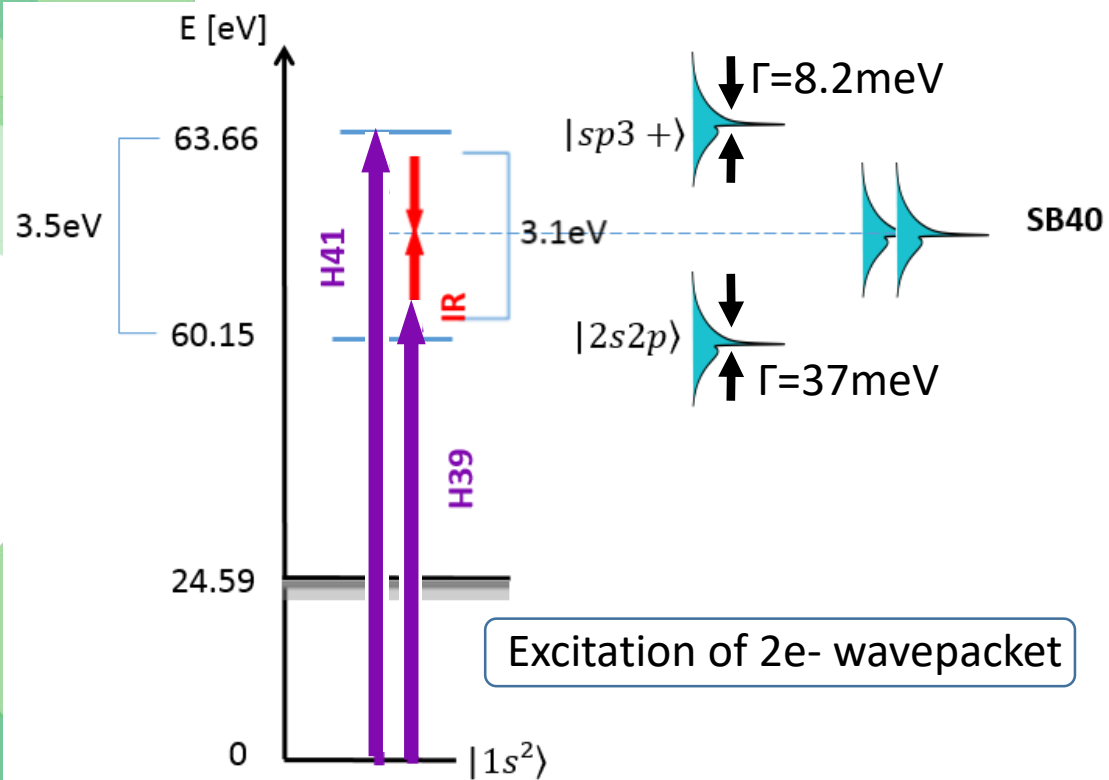
Coherent XUV+IR multiphoton ionization

**RAINBOW  
RABBIT**

V.Gruson et al., Science(2016)

SCIENTIFIC ACTIVITIES AND ACHIEVED GOALS

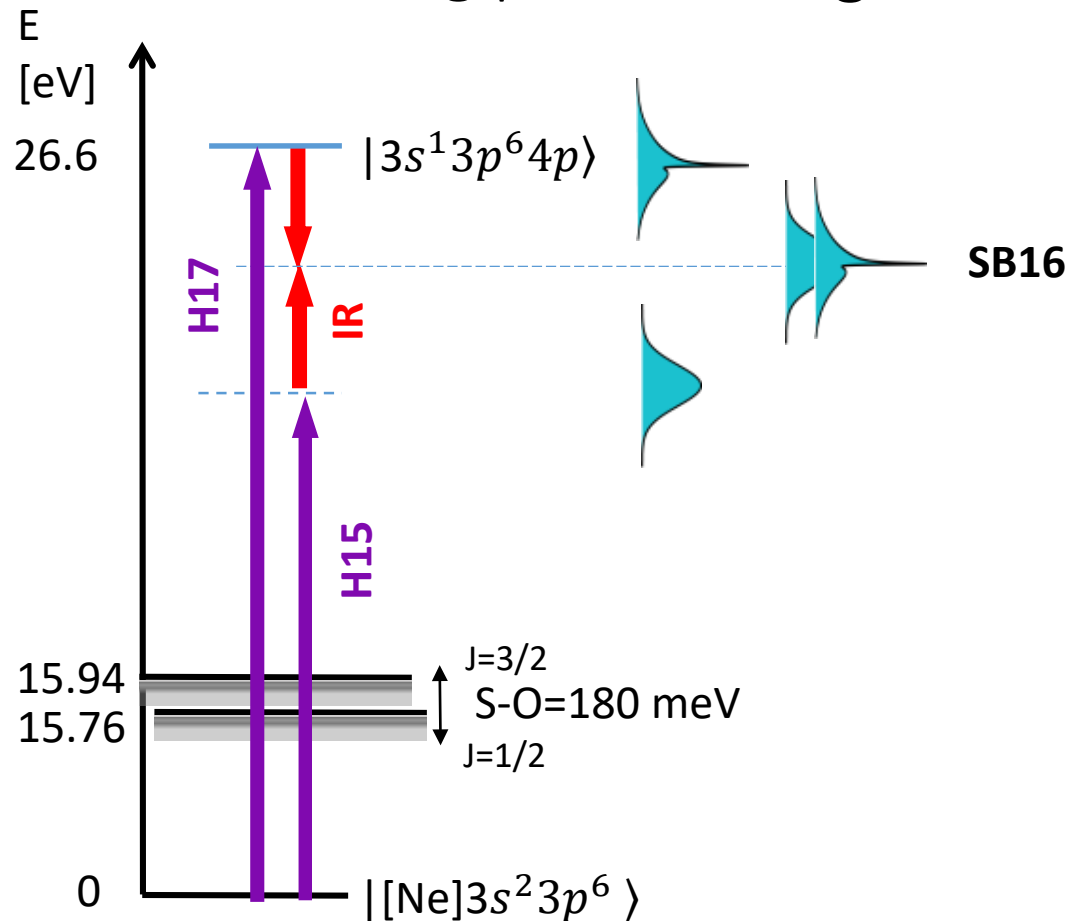
# Coherent excitation of both $2s2p$ and $sp3+$ in Helium



Temporal reconstruction of the complex 2e- wavepacket

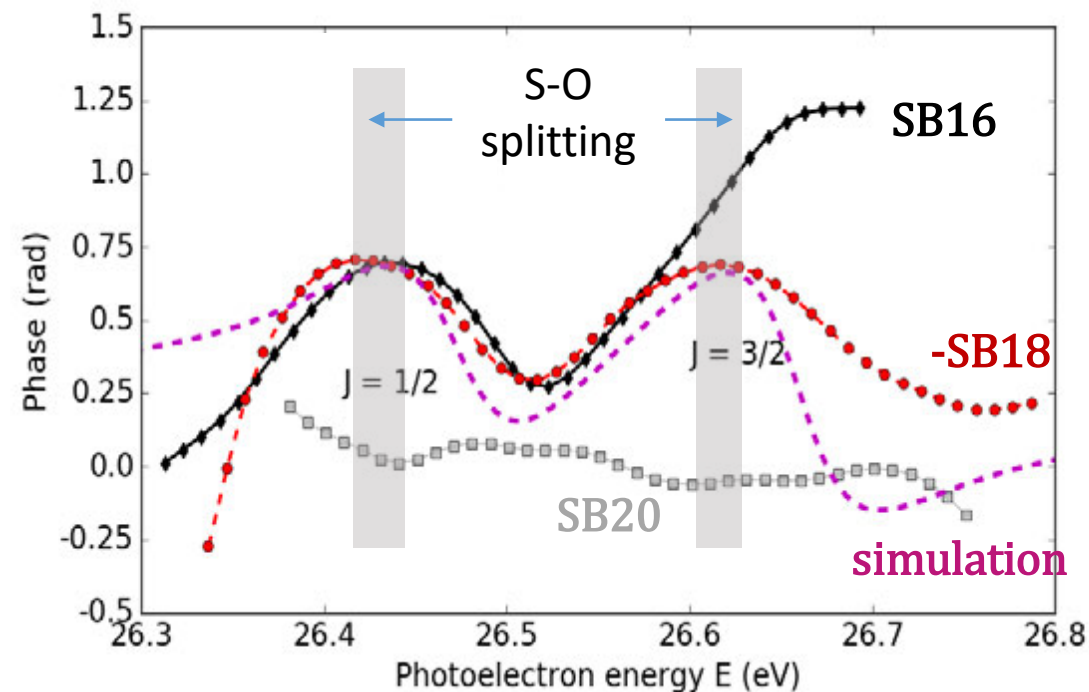
SCIENTIFIC ACTIVITIES AND ACHIEVED GOALS

Scattering phase of Argon  $3s^1 3p^6 4p$



More complex dynamics:

- Spin-Orbit splitting  $\rightarrow$  high resolution required
- More than one autoionization channel

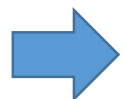


Access to the wavepacket of each S-O component

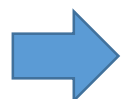
## OTHER ACTIVITIES



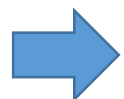
1<sup>st</sup> **Secondment** in Lund: Group of Anne L'Huilier



**Conferences:** -GDR Ultrafast Phenomena, poster.  
-MEDEA Summer school on “ Ultrafast Dynamics with Intense Radiation Sources”, poster.  
-“2<sup>nd</sup> Users Meeting of ATTOLAB”, presentation.



**Soft skills:** -Winter school in “ Communication skills and outreach ”  
-Master courses on “Ultrashort optical pulses and applications”  
-Laser safety seminar  
-French language



**1<sup>st</sup> Outreach Activity:** Lycée Kleber, Strasbourg  
Module 7, 14 students (ages: 18)  
Module 8, 101 students (ages: 15-18)



## FUTURE WORK

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- **Photoionization spectroscopy:**

Investigation of more complex systems (Nitrogen, different types of resonances)

From observation to control → Increase IR intensity .

- **High harmonic spectroscopy :**

Hole oscillation in diatomic and triatomic molecules: Two Source Interferometry

Mid-IR driving laser

Phase plate @ 1350nm tested

(2<sup>nd</sup> Secondment @ Milan)

Thank you for your attention !