

EARLY STAGE RESEARCHER

## Pusala Aditya

PROJECT: *Alignment and HHG imaging of nonplanar molecules*

Host institution: Politecnico di Milano.

Supervisors: Prof. Salvatore Stagira,  
Prof. Henrik Stapelfeldt,  
Dr. Andreas Assion.

Start date: 21-11-2015.

## CURRICULUM VITAE



## Aditya Pusala

Ph.D student  
Department of Physics  
Politecnico di Milano  
Milan, Italy



### Education

- Master of Sciences, Physics (2013-2015)  
University of Massachusetts Boston – USA
- Masters of Science, Physics (specialization in Photonics)  
Sri Sathya Sai Institute of Higher Learning (2011-2013) - India



### Experience

- University of Massachusetts Boston
- Development and setting up of Photoacoustic Z-Scan Technique.
  - Using Nonlinear Photoacoustic Z-Scan Measurements to study Nonlinear properties of Novel Organic Materials.



### Skills

- Training in operation of ultra-high vacuum equipment's.
- Learning programming languages (Python, Matlab).
- Learning routines for Data Analysis and laser beam control and stabilization.

### Masters Internship at Harvard Medical School

- Developing cost effective and noninvasive Photoacoustic fluorescence technique to study cancer cells.

### Other Skills

- Setup of Photo-Acoustic Z-Scan technique.
- Fourier Filtering for image processing.

### Teaching Assistant

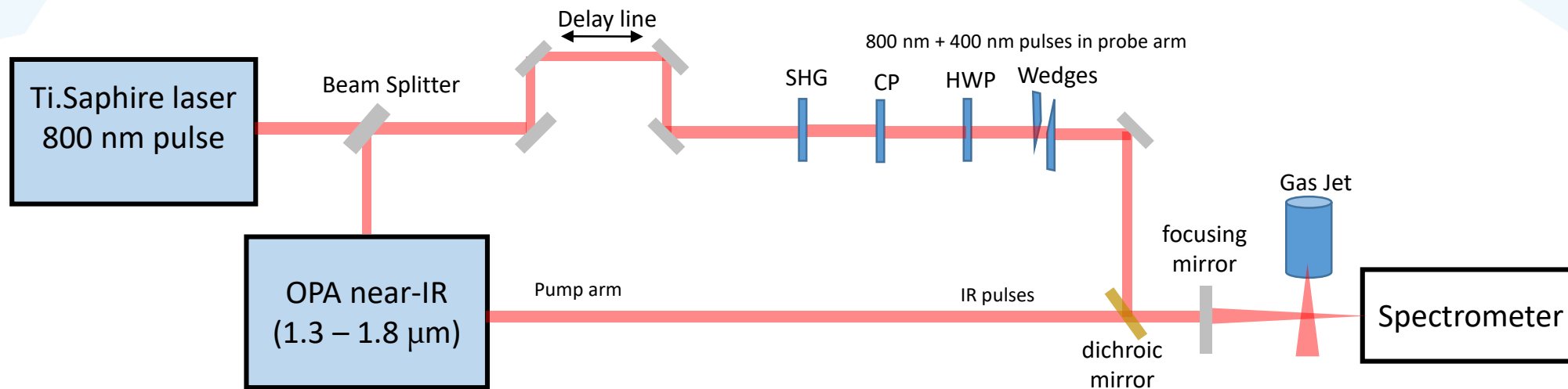
- Lead the physics discussing class. Been a physics tutor helping students with their study and test.

## SCIENTIFIC SCOPE OF THE PROJECT

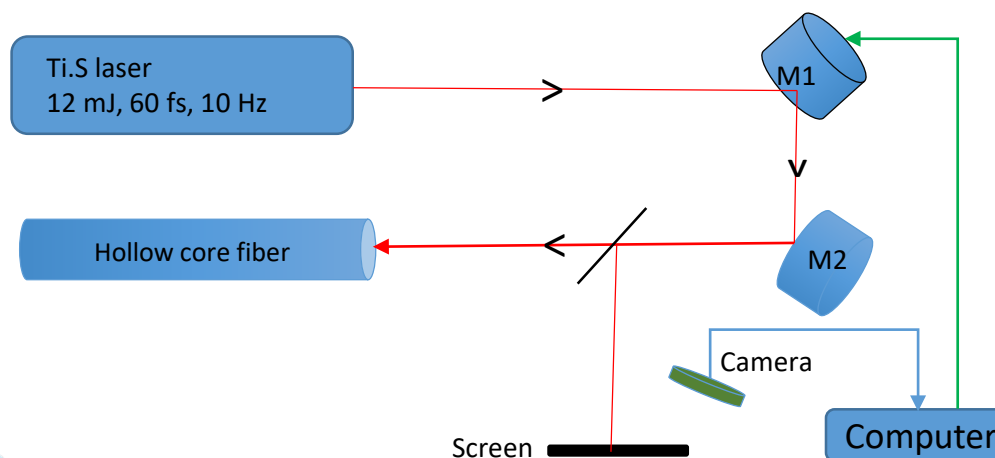
- Reconstruction of Molecular orbitals of Planar and Non Planar molecules using High- order harmonic generation (HHG).
- Development of a high energy tunable parametric source in the near-IR.
- Study of impulsive orientation of molecules using two color laser pulses.
- Development of a tunable source in the visible based on Four Wave Mixing process.
- Study of molecular alignment and fragmentation dynamics using FEL radiation (at FERMI).

SCIENTIFIC ACTIVITIES AND GOALS IN PROGRESS

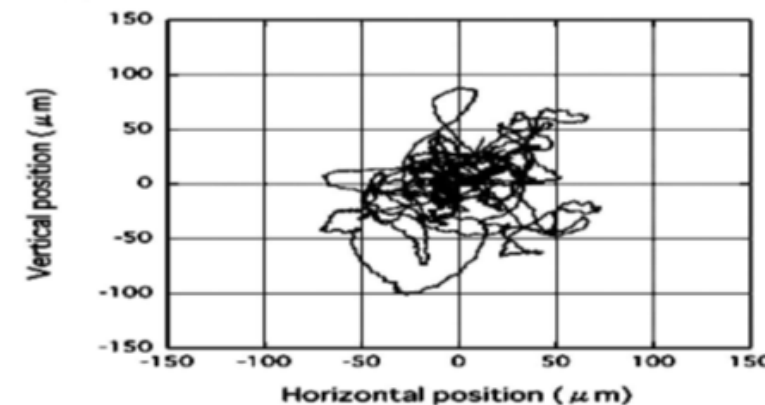
Experimental Setup for impulsive orientation of molecules using two color laser pulses



Experimental Setup of Pointing Stabilization

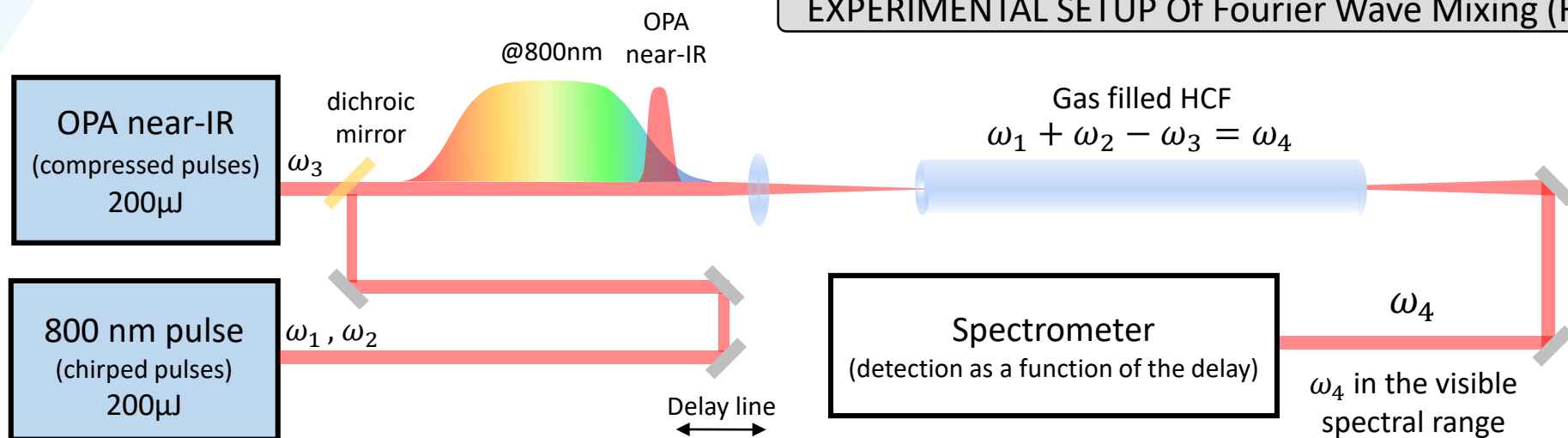


Result

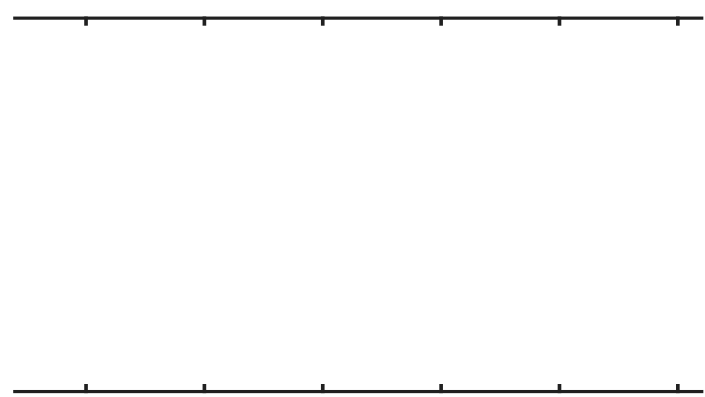
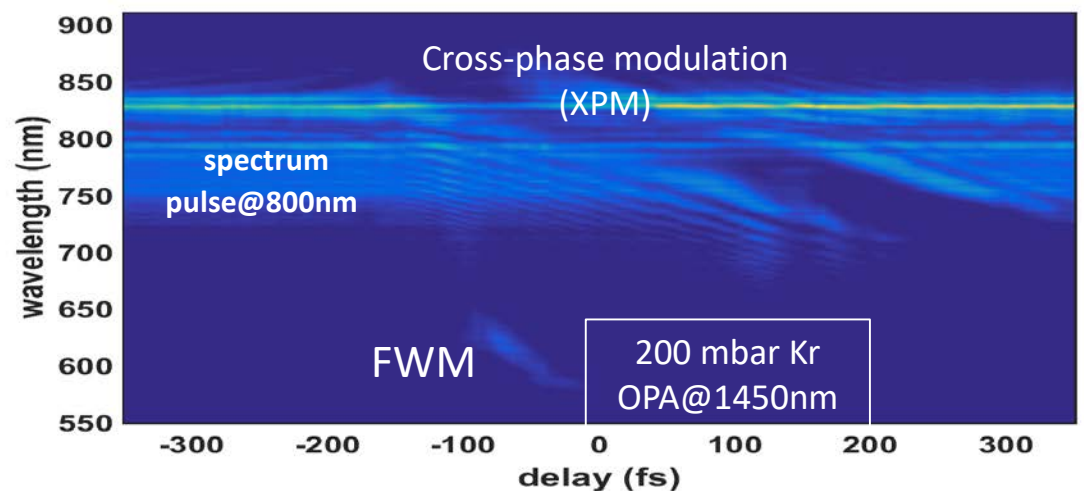


# SCIENTIFIC ACTIVITIES AND GOALS IN PROGRESS

## EXPERIMENTAL SETUP Of Fourier Wave Mixing (FWM)



## RESULTS



## SECONDMENTS, OUTREACH ACTIVITIES AND SOFT SKILLS TRAINING

### ➤ *Planned Secondments:*

- 1) FEMTO Laser company(27 month) : Investigation of CEP instabilities in the generation and amplification of IR and mid-IR pulses.
- 2) Aarhus University(33 month) : Techniques for three-dimensional alignment of nonplanar molecules.

### ➤ *Outreach Activities: Two Activites has been performed.*

- 1) Jean Monnet – 38 students.
- 2) Istituto Ernesto Breda – 24 students.

### ➤ *Soft Skills Training:*

- ✓ Presented Photonic explorer kit at “MEET ME TONIGHT” event.
- ✓ Learning Programing in Python and Matlab.

### ➤ *Courses Attended : Completed 25 credits.*

- 1) Modelling with Multirange Methods.
- 2) Spectroscopy of Solids.
- 3) Advanced Microscopy Techniques.
- 4) Photons and Bits for information technology.
- 5) Ethics in Research.



Explaining the photonic explorer kit to the students at Jean Monnet School, Milano.



## CAREER DEVELOPMENT PLAN AND FUTURE ACTIVITIES

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- Scaling of FWM based sources to different spectral regions will be investigated.
- Development and Extension of OPA sources to Mid infrared for HHG.
- To investigate the orientation of Molecules using Two color laser pulses.
- Tomographic investigation in non linear molecules(in ethylene) and in asymmetric molecules(CO, N<sub>2</sub>O, H<sub>2</sub>O) using HHG.

# Thank you