# Minutes kick-off meeting PWIE SP X1 18-05-2022

Present: Michael Reinhard (FZJ), Gennady Sergeinko (FZJ), Stephan Ertmer (FZJ), Hennie van der Meiden (DIFFER), Timo Gans (DCU). Pavel Veis (CU) will be contacted later

Remark: For 2022 a lot of tasks described in the work package concerns only design and installation of diagnostics.

**Hennie**

Hennie motivated and summarized the goals of the SP X1 project

**Michael Reinhard – FZJ deliverables**

* VUV-OES results H/H2 delayed, but some preparations are done: translation system for heavy VUV spectrometer, turbo pump system ready, grating controller needs to be arranged. VUV spectrometer needs cleaning from oil.

Next steps:

* Spectrometer will be tested
* Mount spectrometer at PSI-2
* Experiments at PSI-2
* LIF system for H/H2 ro-vib. measurements is available (system used at TEXTOR by Sebastijan). Conceptional design done:

- Probably an Nd:YAG laser (instead of excimer laser) will be used for pumping the dye laser.

* The dye laser needs refurbishment still

**Hennie – DIFFER deliverables**

* TALIF is being setup for measuring atomic density in Magnum-PSI:
* Dye laser is operational
* TALIF is being performed on a Krypton gas in a gas cell, first results expected coming weeks
* First TALIF atomic density measurements will be performed on Pilot-PSI-upgrade, expected in June 2022. After this the system will be implemented in Magnum
* Conceptual design CARS/SARS is ongoing, one technician is working on that.
Implementation of CARS will start in September 2022
* In collaboration with Erasmus student, under super vision of Pavel and Hennie/Ivo, VUV passive spectroscopy will be performed to measure ro-vib. ground state distribution of H2 and isotopes

**Pavel – CU deliverables (notes to be included later)**

* VUV passive spectroscopy will be performed in Magnum this year

**Timo Gans – DCU deliverables**

* Literature study performed.
* Timo showed some 2D results of ps-TALIF on atmospheric ‘H2O’ plasma.
* 3-photon and 4 photon excitation schemes will be explored, using ps and or fs lasers.
* First tests will be performed on a H2 gas cell, this work will be done in the ps &fs laser spectroscopy facility

*Intermezzo*

3-photon or 4-photon excitation scheme can be deployed for LIF on H2 using tuneable high-intensity picosecond or femtosecond laser systems. The advantage of multi photon schemes can be found in the fact that the use of vacuum beamlines can be avoided.

The selection rules change in comparison to 1-photon and 2-photon schemes and suitable excitation schemes need to be developed and tested. 3-photon schemes have higher excitation cross-sections than 4-photon schemes. However, the use of even number of photons, i.e. 4, allows spectrally symmetric excitation. This is beneficial as it can compensate for spectrally broader pulses, in particular for femtosecond laser systems. Shorter pulses also provide the benefit of improved discrimination between signal and background in high background environments.

**In general: risk for the project**

No impact from COVID to be expected so far…