

Introduction



Collaboration Meeting



UPPSALA
UNIVERSITET



Patric Muggli *AWAKE collaboration*

Max Planck Institute for Physics

Munich

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<https://www.mpp.mpg.de/~muggli>



MAX-PLANCK-INSTITUT
FÜR PHYSIK

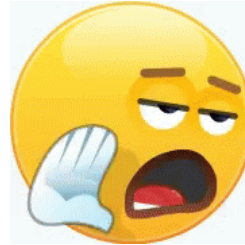


Thank you to Kevin et al.

Ευχαριστώ τον Κέβιν κτλ.

Welcome to the collaboration meeting

✧ New Spokesperson: Patric Muggli



New people @ CERN:

- ✧ Marlene Turner (CERN staff, 1st January)
- ✧ Nikita van Gils (PhD, 1st April)
- ✧ Arthur Clairembaud (Master student, 1st April)
- ✧ Bethany Spear (PhD, October 22, 1 year)
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- ✧ ...

Important to be at CERN to effectively contribute to the experiment!
People make it work ...

✧ Run 1: 2016-2018

✧ Self-modulation ✓ ✓ ✓

✧ Acceleration of test e- ✓

✧ Run 2a 2021-2022

✧ e-bunch seeding of SM ✓

✧ Run 2b => 2024

✧ Plasma density step

✧ Discharge plasma source

✧ Run 2c 2028 =>

✧ Injection of witness e-bunch into second, accelerator plasma

✧ Run 2d

✧ Operation with scalable accelerator plasma

✧ Discharge, helicon source

✧ March 2023

✧ Run 2c preparation retreat @ CERN

✧ What?

✧ Who?

✧ Outcome: Q4-2023

NOT NEWS

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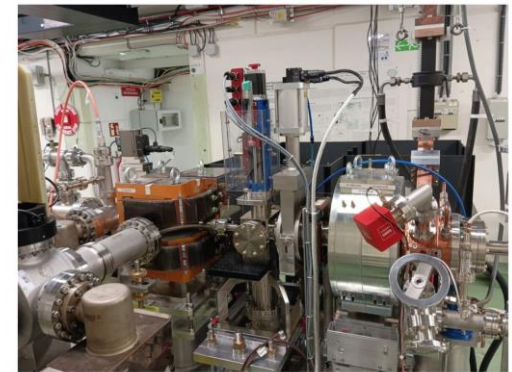
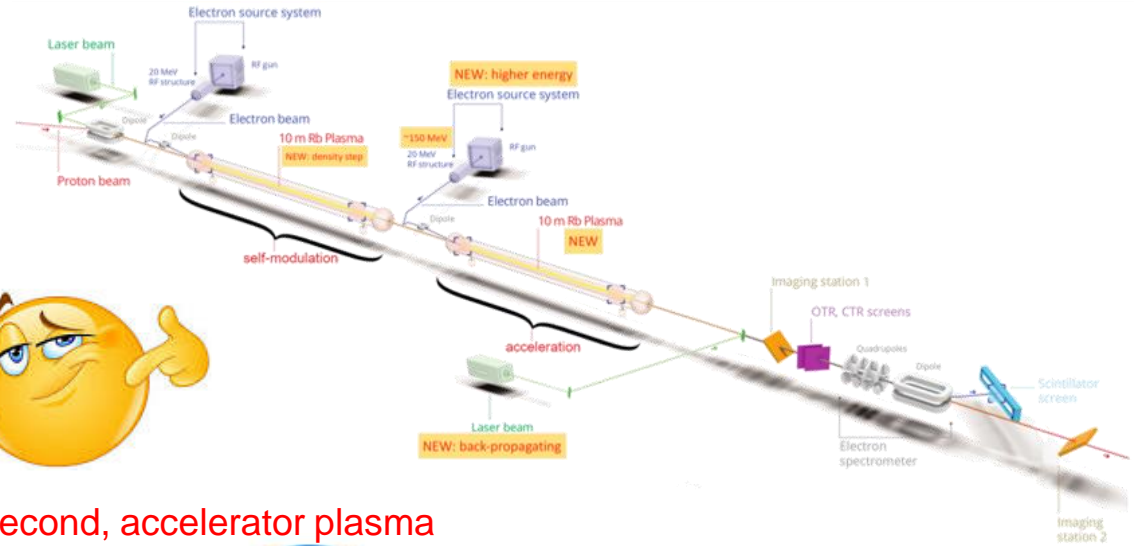


Fig. 8: Picture of the Photo Injector test stand for AWAKE in the CTF2 tunnel.

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Run 2d

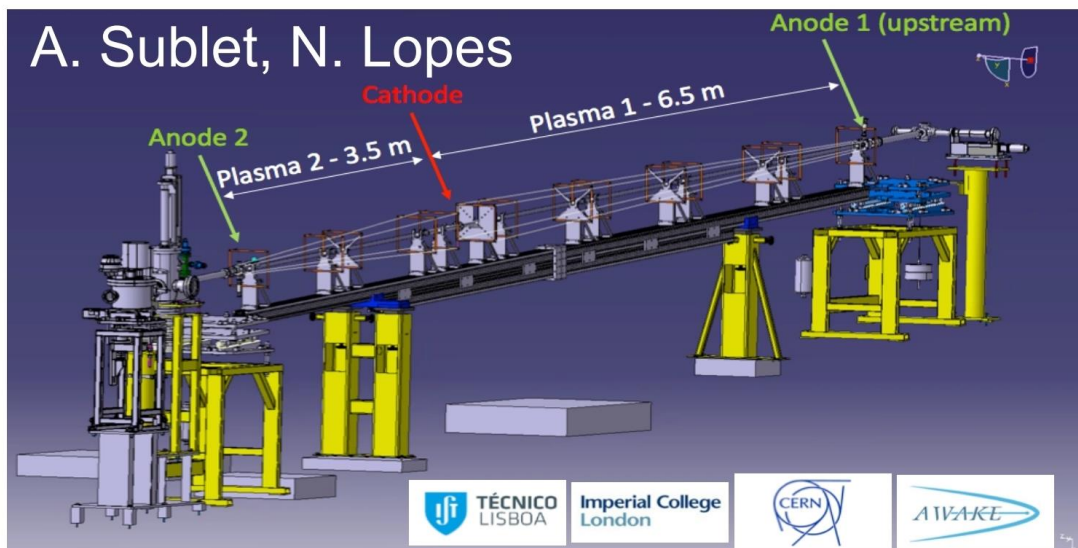
- Operation with scalable accelerator plasma
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March 2023

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 - Outcome: Q4-2023

Research topics, 10m discharge plasma source (DPS), **May 2023**:

- ✧ Plasma source: Ar, Xe, He
- ✧ Self-modulation instability (SMI): $L=3.5, 6.5, 10\text{m}$
- ✧ Current filamentation instability (CFI)
- ✧ Ion motion on SMI, Xe, Ar, He
- ✧ Hose instability at low plasma density, flat beams?
- ✧ Plasma light: diagnostic for wakefields

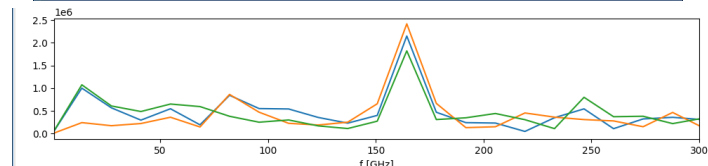
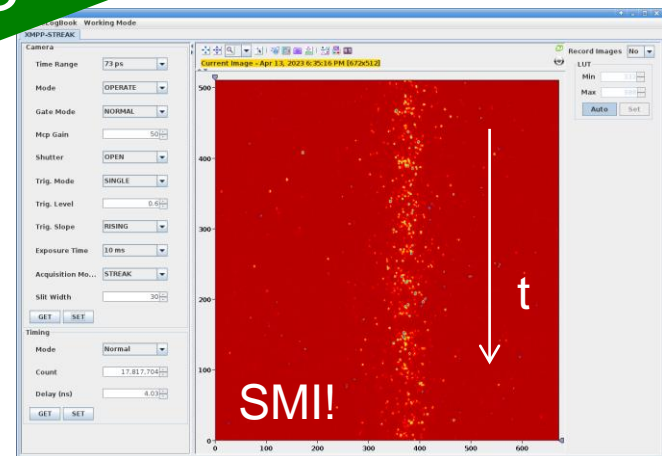
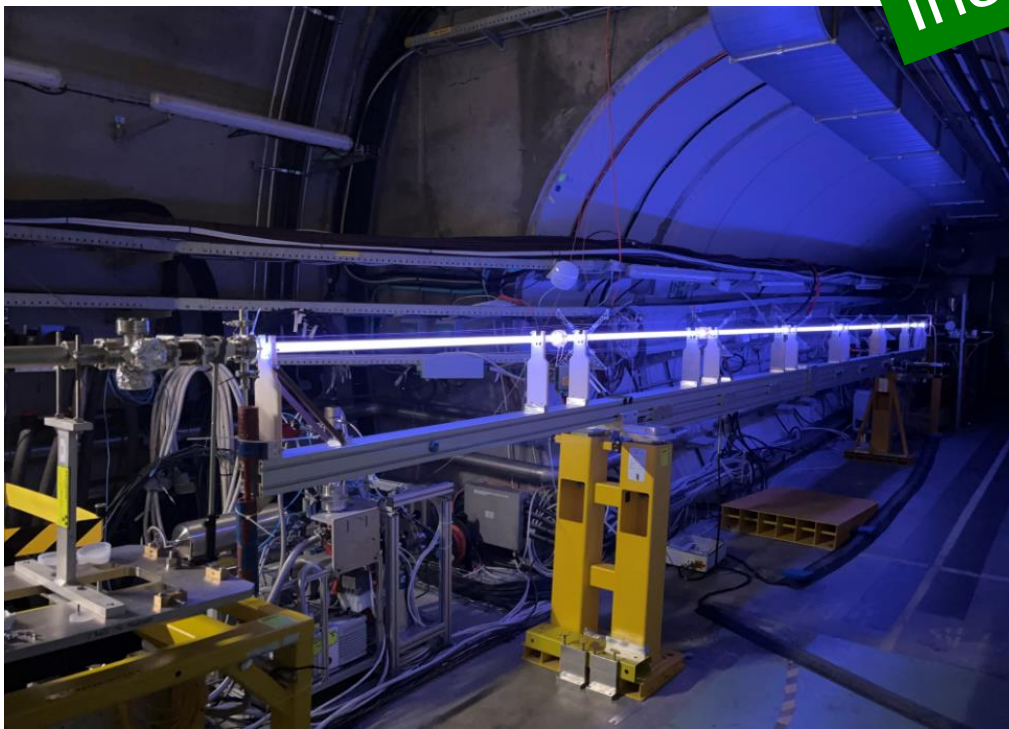


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Installed and running!

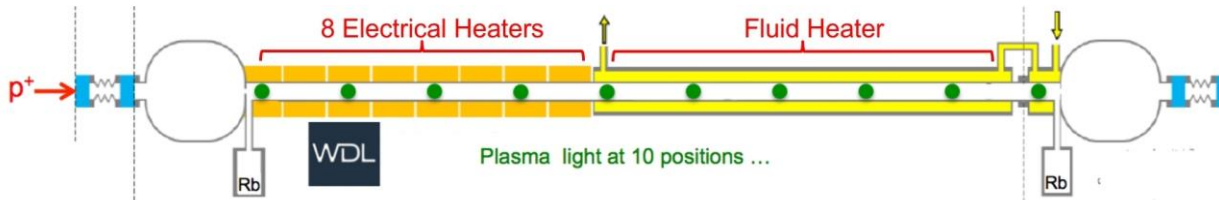
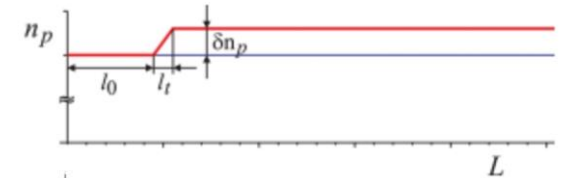
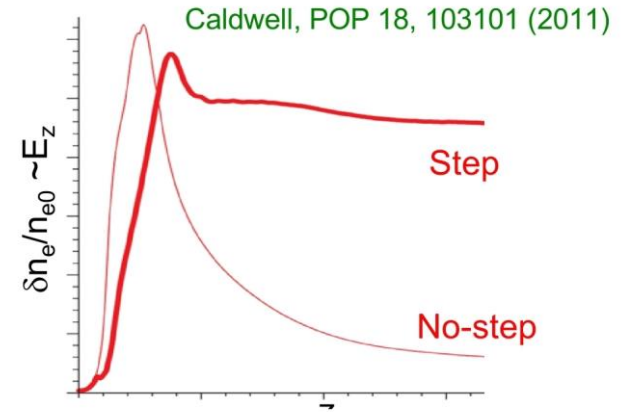
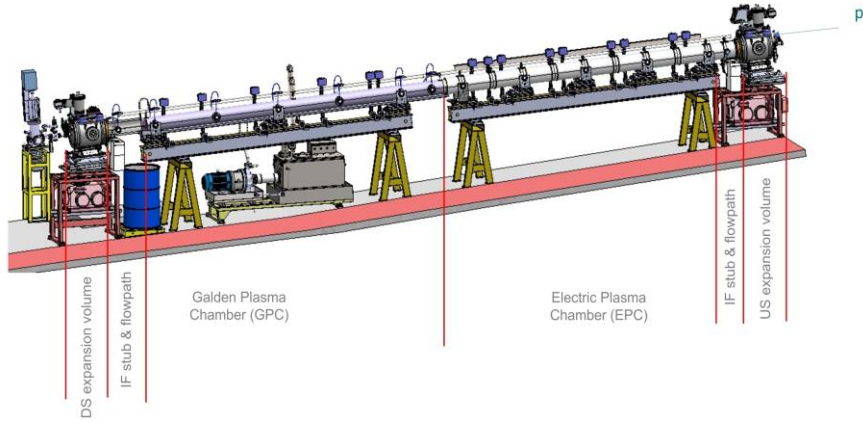
3h test 13/04/2023



$f_{\text{mod}} \sim 164 \text{ GHz} \sim f_{\text{pe}} (n_{e0} \sim 3.4 \times 10^{14} \text{ cm}^{-3})$ ✓
Time-resolved image shows SMI with DPS

Research topics, vapor source, August 2023-2024:

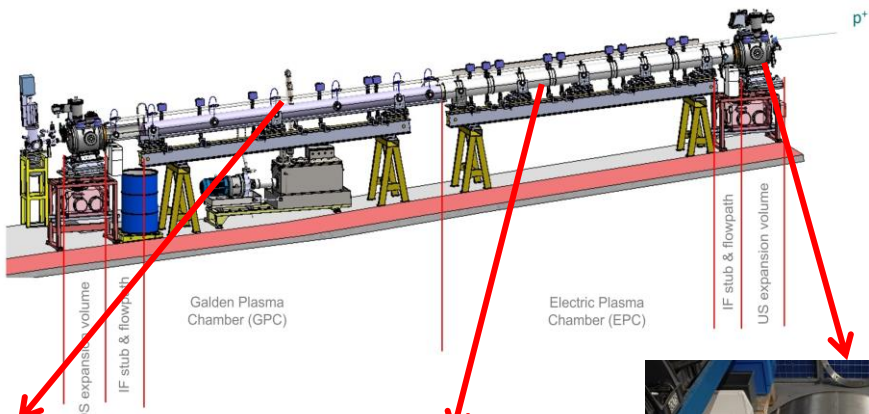
- ✦ Effect of plasma density step on:
 - ✦ Proton bunch, time resolved and integrated images
 - ✦ Plasma light, wakefield diagnostic
 - ✦ e- acceleration
 - ✦ Seeding of self-modulation, RIF and e-bunch
 - ✦ Short plasma (4m?) for self-modulation



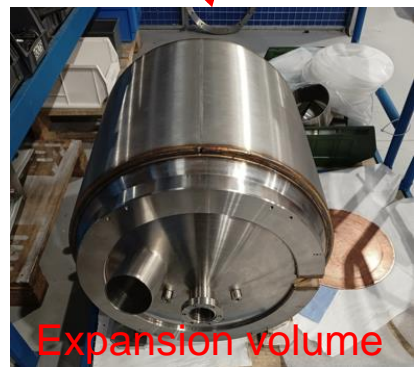
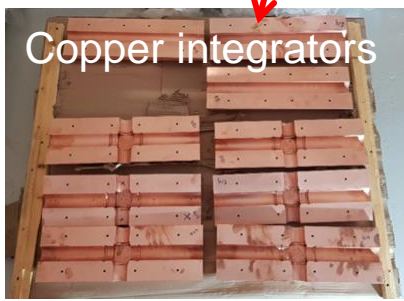
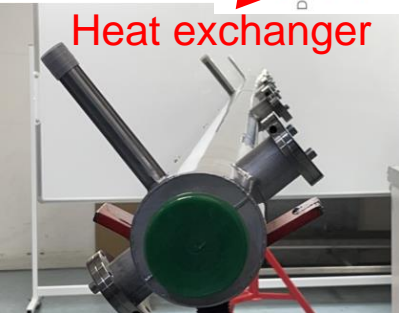
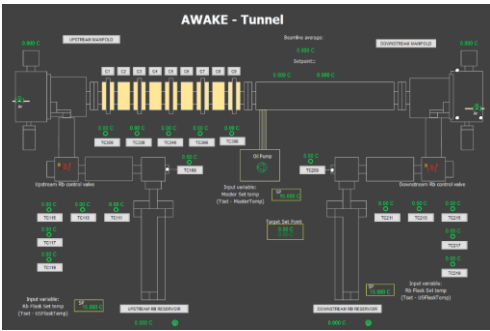
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On schedule!



WDL



In preparation (Collaboration manuscripts, Run 2a):

- ✧ Livio: SMI or not (today)
- ✧ Tatiana: hosing
- ✧ Jan: e- in density ramp
- ✧ Jan: SM RIF seeding
- ✧ ...



✧ Experiments

PHYSICAL REVIEW LETTERS **129**, 024802 (2022)

Editors' Suggestion

Featured in Physics

Controlled Growth of the Self-Modulation of a Relativistic Proton Bunch in Plasma

L. Verra^{1,2,3,*}, G. Zevi Della Porta,¹ J. Pucek,² T. Nechaeva,² S. Wylser,⁴ M. Bergamaschi,² E. Senes,¹
E. Guran,¹ J. T. Moody,² M. Á. Kedves,⁵ E. Gschwendtner,¹ and P. Muggli²


(AWAKE Collaboration)

✧ Simulations

PHYSICAL REVIEW LETTERS **130**, 115001 (2023)

Mitigation of the Onset of Hosing in the Linear Regime through Plasma Frequency Detuning

Mariana Moreira^{1,*}, Patric Muggli,^{2,3} and Jorge Vieira^{1,†}
¹GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Universidade de Lisboa, 1049-001 Lisboa, Portugal
²Max Planck Institute for Physics, D-80805 Munich, Germany
³CERN, CH-1211 Geneva, Switzerland

 (Received 1 August 2022; accepted 27 January 2023; published 17 March 2023)

✧ Complete list, many other contributions... Giovanni

Opportunity to:

- ❖ Meet new people ...
- ❖ Make personal contacts ...
- ❖ Be informed about plans ...
- ❖ Generate new ideas ...

Participate



WELCOME TO UPPSALA

Participate



Thank you to Kevin et al.

ΕΥΧΑΡΙΣΤΙΑ ΣΤΟ ΚΕΛΙΟ ΕΓΓ.

Welcome to the collaboration meeting

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