WP7 Task 4.2 Update

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On behalf of the collaboration

25 April, 2023

A reminder

Task 7.4. A 4-channel electronic board prototype for cluster counting and Hybrid readout for high pressure gas TPC for neutrino physics

- Design electronics and realise a 4-channel prototype for cluster counting in ultra-light drift chambers
- Identification and characterisation of adequate gasses
- Construction of a small-scale TPC prototype (#10 l) with a hybrid charge and optical readout

(https://aidainnova.web.cern.ch/wp7)

Collaborators

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- **Royal Holloway**, University of London, UK
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- University of **Santiago**, ES
  - Diego Gonzalez Diaz
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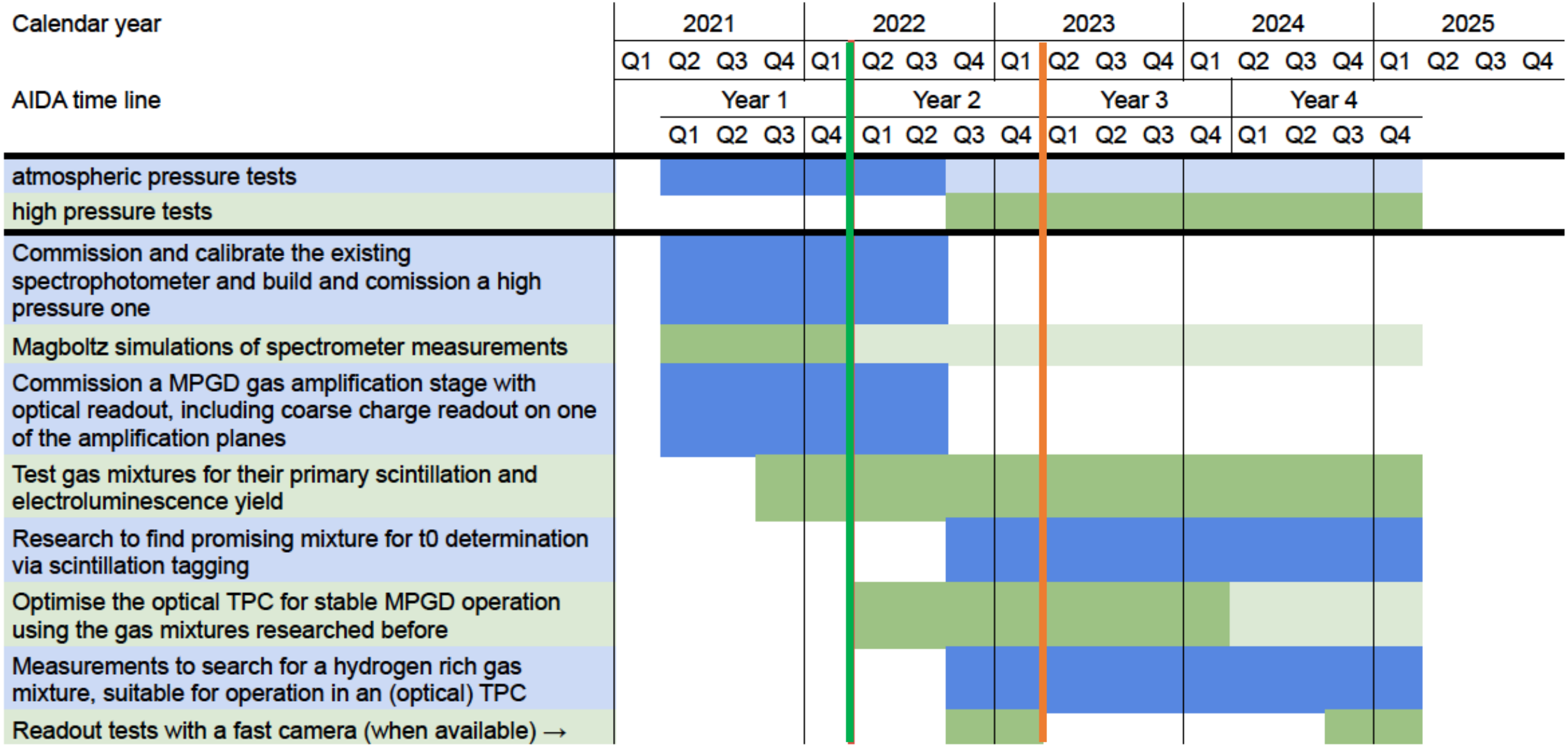
  - Justo Martín-Albo
- University of **Warwick**, UK
  - Xianguo Lu



Main development: RHUL TPC moved to FNAL, measurement ready to be published; Warwick TPC (WarTPC) platform and Bari Lab being set up.

ALICE MWPC testing at RHUL

2022: Vessel, TPC, and MWPC moved to FNAL for beam test (TOAD@DUNE)

2023 April

First operation of an ALICE OROC operated in high pressure $Ar\text{-}CO_2$ and $Ar\text{-}CH_4$

“The largest gain achieved at 4.8bar was (64 ± 2) · 10^3 at stable conditions with an anode wire voltage of 2990 kV in Ar-CH4 (95.9-4.1). In Ar-CO2 (90-10) a gain of (4.2 ± 0.1) · 10^3 was observed at an anode voltage of 2975 V at 4 barA gas pressure.”

(to appear very soon)

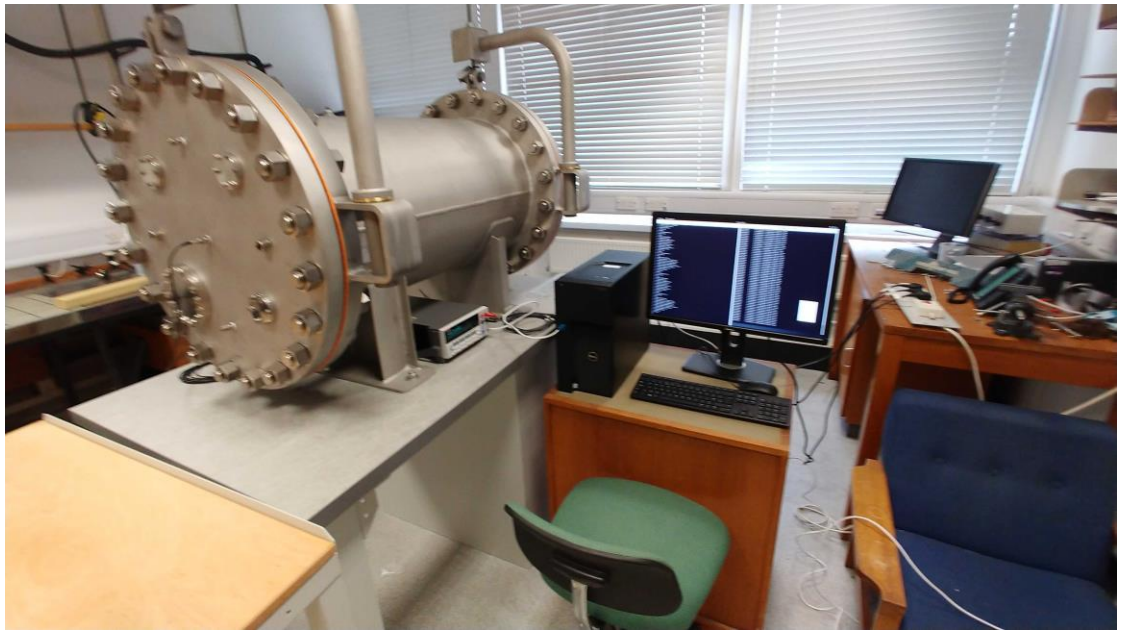
WarTPC Overview and Status

- 10 bar HPgTPC designed for gas studies and optical readout development for generic gas TPC R&D
- Optical readout will be done using a TimePix3 camera.
- Will initially operate at 1 bar, before upgrading to 10 bar operation.

- Currently, the gas system has been set up, and the vessel is leak tight.
- Electronics for TPC are currently being built. Field Cage, Cathode, and Anode Holder have been finished

2022 August: Pressure vessel (200 L, 10 bar) being set up in Warwick

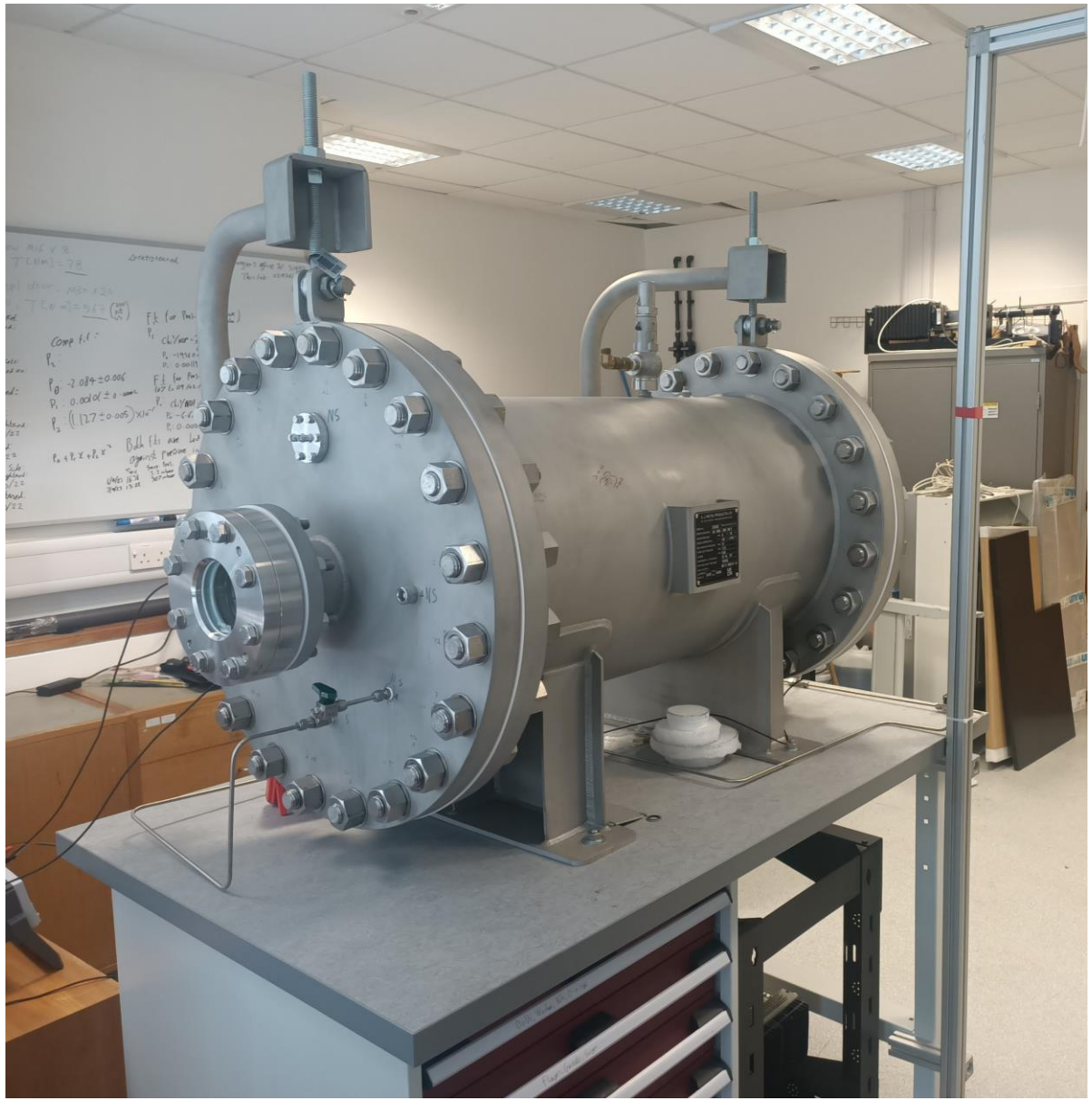
2022 November: Vessel testing at pressure and TPC field cage being built



2022 December: gas system built

A-side

B-side



2023 April: field cage and anode and cathode holders built

Bari Lab being setup (2022)

Refurbishing to operate a high-pressure TPC prototype:

- high pressure gas line installed
- O2 and CO2 sensors for safety installed
- new ventilation system installed and tested
- instrumenting the lab (e.g. new power supply able to go up 100 kV, new movable table, mass flow meters…)

Design and construction of a high-pressure TPC prototype in Bari by using local CAD group and local mechanical workshop

- Goal: to test prototype with different gas mixtures and by using MPGDs and TimePix as readout (2024)

2023 April status

Lab
- setting up of the lab almost done (still need to buy some DAQ components)
- searching a good candidate external company to build the cylinder of the HPTCP
- the flange should be built in home by our mechanical workshop

Contract
- Evaluating candidates for a research contract dedicated to AIDAInnova activities

BACKUP