

# Welcome to the Direct Dark Matter Detection Report Community Feedback Meeting

Sijbrand de Jong (SAC chair)

# History (1)

The GA approved the mandate and established the DDMD committee in its 16-17 May 2019 meeting.

Mandate pre-amble:

- Elucidating the nature of Dark Matter is a high-priority item in the APPEC 2017-2026 Strategy;
- Dark Matter particle detection is by now a global effort;
- Underground labs play a crucial role in ongoing and future detectors;
- APPEC seeks advice for the next steps.

Charge to Dark Matter Direct Detection committee is to provide an assessment of:

- The *global context* of DM particle searches;
- A *comparative SWOT analysis* of existing, planned and proposed DM detectors & technologies that have the potential to surpass the neutrino floor;
- The *required infrastructure* in Europe;
- Possible *technological and scientific synergies* with research and R&D outside the direct DM detection field;
- The inventory of *other research* that can be done with or benefit from DM direct detection experiments and technologies;
- Any other recommendations that the committee may deem relevant.

# History (2)

## Committee Composition:

- Chair:
  - Leszek Roszkowski
- Axions and ALPs:
  - Bela Majorovits
- Liquid Argon Detectors:
  - Giuliana Fiorillo
  - Mark Boulay
- Liquid Xenon Detectors:
  - Marc Schumann
  - Kimberly Palladino
- Scintillating crystals & CCD detectors:
  - Federica Petricca
  - Susana Cebrián
- Bolometers:
  - Julien Billard
- Theory and Astronomy:
  - Joachim Kopp
  - Anne Green
  - Laura Covi

A big thank-you for the impressive work done by the committee !

# History (3)

- The DDMD committee delivered a first version of the report on 15 May 2020, as input to the 19 May 2020 SAC meeting, where it was presented by the committee chair, Leszek Roszkowski, and discussed by the SAC.
- In view of the short availability of the report, further comments were collected by the SAC chair and transmitted to the DDMD committee mid-June 2020.
- The committee sent a second draft to the SAC on 16 October 2020, which was discussed in the SAC meeting of 4 November 2020. At that meeting **the SAC concluded the report to be both correct and complete**. It also determined the next steps, including today's community feedback meeting.

# Direct Detection of Dark Matter

## APPEC Committee Report

Version 1.02 (9 October 2020)

### Committee Members:

Julien Billard<sup>1</sup>, Mark Boulay<sup>2</sup>, Susana Cebrián<sup>3</sup>,  
Giuliana Fiorillo<sup>5</sup>, Anne Green<sup>6</sup>, Joachim Kopp<sup>7</sup>,  
Kimberly Palladino<sup>9,12</sup>, Federica Petricca<sup>8</sup>, Leszek Roszkowski<sup>10</sup>,  
Thomas J. Shull<sup>11</sup>

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<sup>7</sup> CERN, Geneva, Switzerland

<sup>8</sup> Max-Planck-Institut für Physik, Munich, Germany

<sup>9</sup> Department of Physics, University of Wisconsin - Madison, Madison, WI, USA

<sup>10</sup> Astronomical Center PAS and Institute of Nuclear Physics, Warsaw, Poland

<sup>11</sup> University of Freiburg, Freiburg, Germany

<sup>12</sup> Physics, Oxford University, Oxford, UK

# Next steps

- Community feedback: today !
- The goal is for the DDMD committee to include the community feedback into an updated document by the end of this month (February 2021)
- The SAC plans to review this updated document by March 2021 and forward it, with its own comments (if any), to the APPEC General Assembly
- The document is aimed to be tabled for endorsement by the GA in April 2021.
- Upon endorsement it will be publicly released.

...es an extensive review of the experimental programme of searches of particle dark matter. It focuses mostly on European current and planned, but does it within a broader context of a activity in the field. It aims at identifying the virtues, opportunities and challenges associated with the different experimental approaches and techniques. It presents scientific and technological synergies, both existing and emerging, with some other areas of particle physics, notably collider and neutrino programmes, and beyond. It addresses the issue of infrastructure in light of the growing needs and challenges of the different experimental searches. Finally, the Report makes a number of recommendations from the perspective of a long-term future of the field.

# Today's Community Feedback Meeting

- The aim:
  - Solicit comments on the draft report from the APP community at large.
  - Produce a community view.
- The format:
  - Short introductions followed by comments and questions from the audience.
  - In the discussion session you can **raise your virtual hand** to ask for the floor, or type your comment or question into the **chat window**.
  - Please, stick to the facts, this report is the scientific input to the GA, which will add the science policy aspects.
  - Please, be precise to where and what in the document can be improved with respect to *correctness, completeness and clarity*.
  - Please, state your name and affiliation when given the floor.

The meeting will be audio recorded. The recordings will be used to make sure all issues raised will be correctly addressed by the DDMD committee for its final document. After that the recordings will be deleted.

# Agenda

10:40 – 11:00	Overview of the report	Leszek Roszkowski
11:00 – 11:15	WIMP search programme introduction	Federica Petricca
11:15 – 11:30	WIMP search infrastructure introduction	Giuliana Fiorillo
11:30 – 12:15	WIMP direct detection discussion	moderators: Julien Billard & Marc Schumann
12:15 – 13:15	LUNCH BREAK	
13:15 – 14:00	WIMP technology and infrastructure discussion	moderators: Julien Billard & Marc Schumann
14:00 – 14:15	Axion/ALP searches introduction	Laura Covi
14:15 – 14:30	Axion/ALP technology and infrastructure introduction	Béla Majorovits
14:30 – 15:00	Axion/ALP direct detection discussion	moderators: Béla Majorovits, Laura Covi
15:00 – 15:30	TEA BREAK	
15:30 – 16:00	Axion/ALP technology and infrastructure discussion	moderator: Béla Majorovits
16:00 – 16:10	Broader context introduction	Joachim Kopp
16:10 – 16:40	Broader context discussion	moderators: Kimberly Palladino, Leszek Roszkowski, Susana Cebrián
16:45 – 17:00	Meeting Summary	Sijbrand de Jong