NEMESIS

New EMMA measurements including neutrons

New NEMESIS Results (#394)

Reporting DM-like anomalies

W.H. Trzaska*

on behalf of the **NEMESIS Collaboration**

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Collaboration

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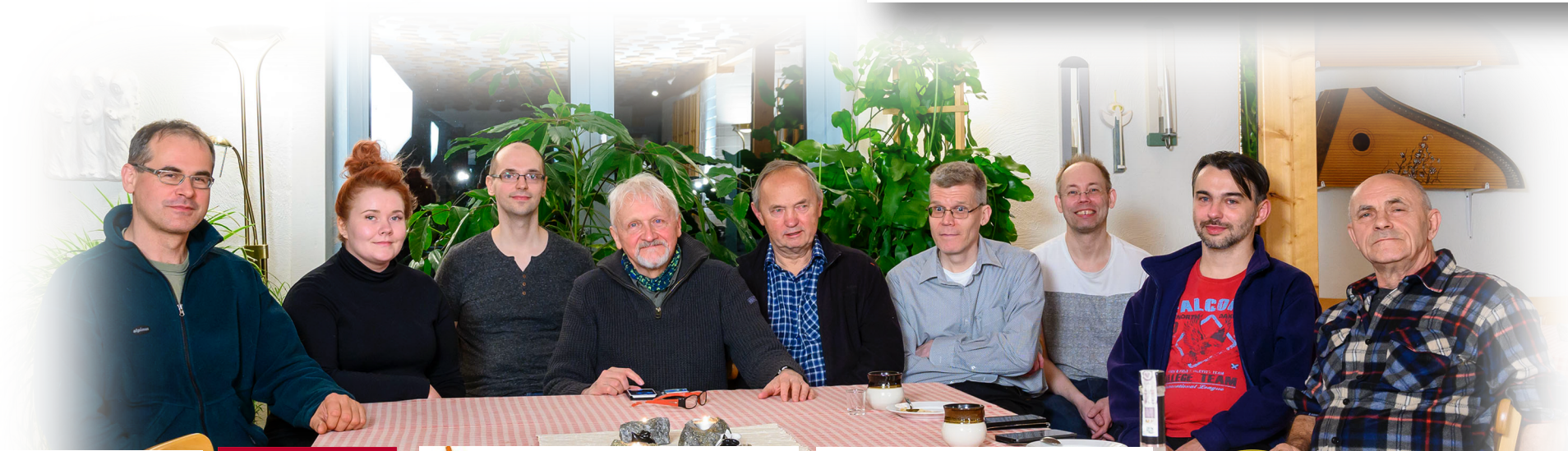

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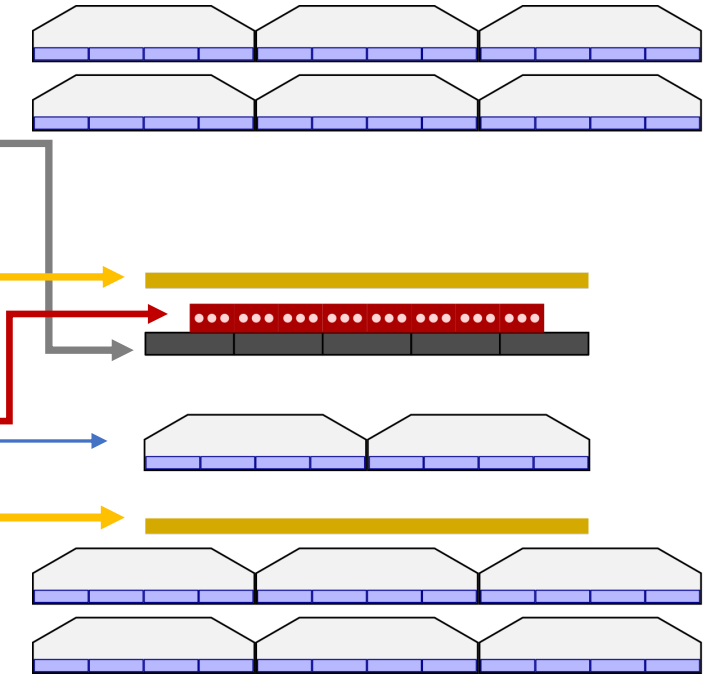
NEMESIS

New EMMA measurements including neutrons

Our experiment

at the depth of 210 m.w.e.

- 349-day 565 kg Pb target run
- 166-day background run
- 736-pixel tracking detectors
- 14 ^{3}He neutron detectors
- 2 large-area scintillators

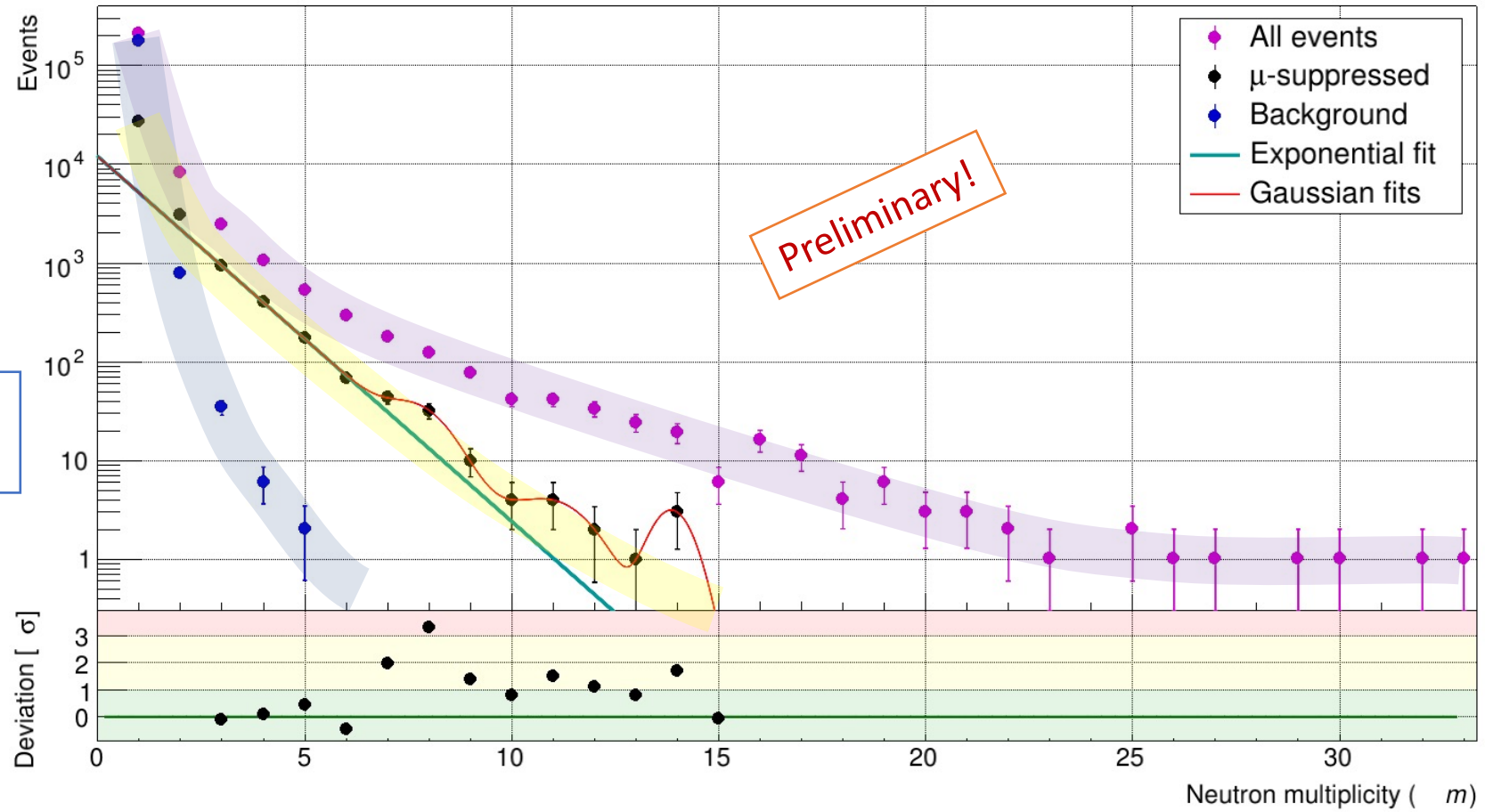


Neutrons from Pb
in anti-coincidence
with traversing CR μ

Neutron multiplicity spectra

NEMESIS

New EMMA measurements including neutrons



Bgd neutrons
no target

Pb target
all neutron events

Preliminary interpretation

NEMESIS

New EMMA measurements including neutrons

NMDS 2002			NEMESIS 2021				Efficiency ratio
Efficiency = 23.2(2)%			Efficiency = 8(2)%				2.9(7)
Neutron multiplicity		WIMP mass GeV/c2	Statistical significance (σ)	Neutron multiplicity		WIMP mass* GeV/c2	Multiplicity ratio
Measured	Actual			Measured	Actual		
23(1)	99(4)	~12	3.6	7.7(3)	102(26)	~13	3.0(2)
33(2)	140(9)	~18	1.5	11.0(6)	146(36)	~18	3.0(2)
47(3)	202(13)	~25	1.8	14.0(4)	185(46)	~23	3.4(3)

*T. Ward, "Radiation Gauge Theory in an Extended Standard Model: Dark Matter, Dark Energy and Higgs Sectors", in preparation

Future plans

What → Confirmation of the observed anomalies at above 5σ level

How → NEMESIS-DM

- Larger targets (Pb and Cu)
- More neutron detectors
- Better muon suppression
- Better scintillator coverage

When → ASAP, commissioning Fall 2022 first results Spring 2023

3t of Pb bricks
for NEMESIS-DM target

NEMESIS

New EMMA measurements including neutrons

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New EMMA measurements including neutrons

NEMESIS posters

- DM-like anomalies in neutron multiplicity spectra
  - # **394** → this poster
- Detection & simulations of μ-induced neutrons
  - # **597** by M. Kasztelan et al.
    High-multiplicity neutron events registered by NEMESIS experiment
- Neutron yields
  - # **622** by K. Jędrzejczak et al.
    First muon-induced neutron yields from NEMESIS experiment


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New EMMA measurements
including neutrons

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New **E**MMA **me**asurement**s** **i**ncluding neutron**s**

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ONLINE ICRC 2021 THE ASTROPARTICLE PHYSICS CONFERENCE Berlin | Germany 37th International Cosmic Ray Conference 12–23 July 2021

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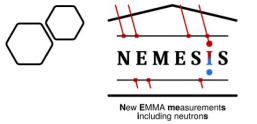

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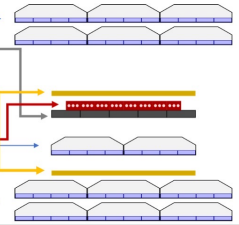

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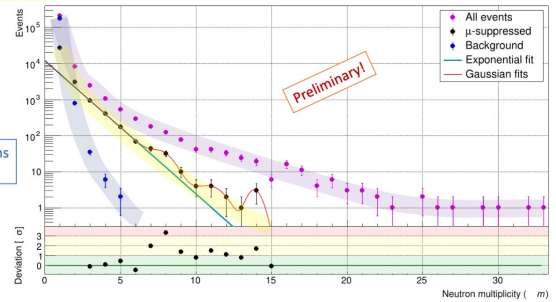
Neutron multiplicity spectra



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Pb target all neutron events

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