

NEMESIS

Collaboration

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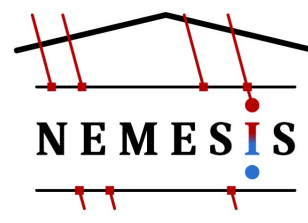
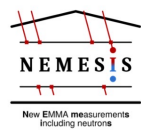


New NEMESIS Results (#394)

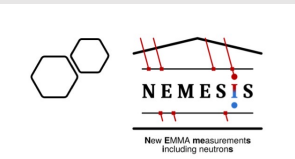
Reporting DM-like anomalies

W.H. Trzaska*
on behalf of the NEMESIS Collaboration

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New EMMA measurements including neutrons



Our experiment

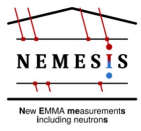
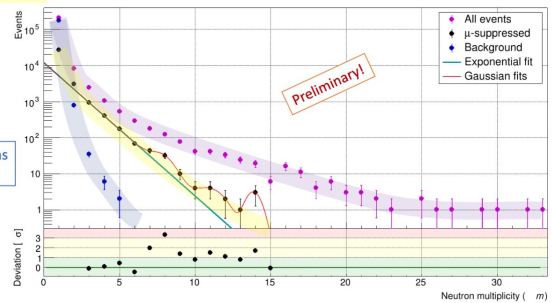
at the depth of 210 m.w.e.



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

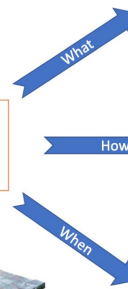
Neutron multiplicity spectra

Neutrons from Pb in anti-coincidence with traversing CR μ



New EMMA measurements including neutrons

Future plans



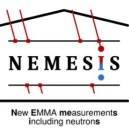
Confirmation of the observed anomalies at above 5σ level

NEMESIS-DM

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



ASAP, commissioning Fall 2022
first results Spring 2023

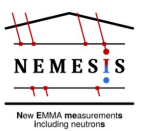


New EMMA measurements including neutrons

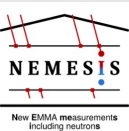


Preliminary interpretation

NMDS 2002		NEMESIS 2021				Efficiency ratio	
Efficiency = 23.2(2)%		Efficiency = 8(2)%				2.9(7)	
Neutron multiplicity	WIMP mass GeV/c ²	Statistical significance (σ)	Neutron multiplicity		WIMP mass* GeV/c ²	Multiplicity ratio	
			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)



New EMMA measurements including neutrons



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. Jedrzejczak et al.
First muon-induced neutron yields from NEMESIS experiment

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