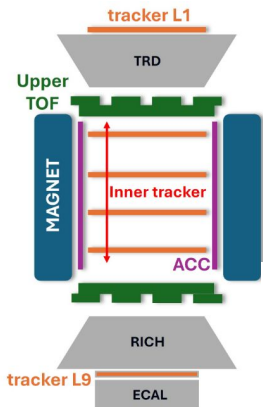


Contribution of INFN/TIFPA to AMS02 in 2025

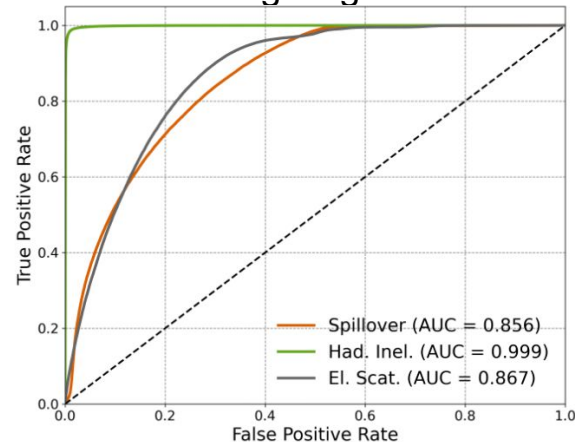
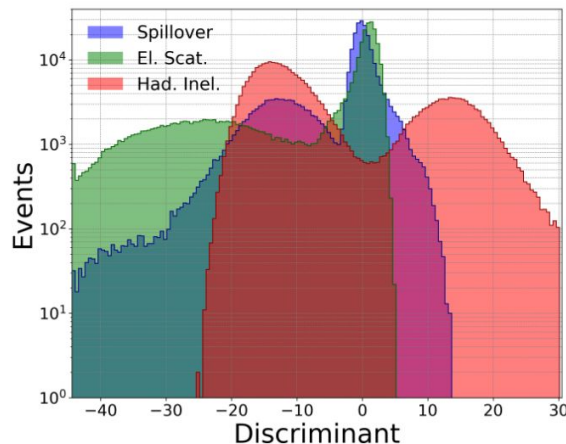
Main task: development of an analysis for anti-He (F. Rossi PhD. supervised by P. Zuccon)



	He	$\bar{\text{He}}$
TRD		
TOF		
TRK		
ACC		
RICH		
ECAL		

Hit on track E (L8)	1.00	-0.04	0.17	-0.10	-0.11	-0.04	-0.08	-0.15	-0.11	0.08	-0.1
Max strip E (L8)	-0.04	1.00	-0.05	0.05	0.02	0.04	0.04	0.07	0.05	0.04	0.07
SR (L8)	0.17	-0.05	1.00	-0.21	-0.21	-0.08	-0.17	-0.17	-0.30	-0.22	-0.26
Strip E (L8)	-0.10	-0.05	-0.21	1.00	0.13	0.05	0.10	0.10	0.18	0.13	0.10
ACC	-0.11	0.05	-0.21	0.13	1.00	0.05	0.10	0.10	0.19	0.13	0.11
Clusters Y	-0.04	0.02	-0.05	0.05	0.05	1.00	0.04	0.04	0.07	0.05	0.03
Clusters X	-0.08	0.04	-0.17	0.10	0.10	0.04	1.00	0.08	0.14	0.11	0.08
Max strip E (L7)	0.08	0.04	-0.17	0.10	0.10	0.04	0.08	1.00	0.15	0.10	0.08
Max strip distance (L8)	-0.15	-0.07	-0.30	0.18	0.19	0.07	0.14	0.15	1.00	0.18	0.14
Strip E (L7)	0.11	0.05	-0.22	0.13	0.13	0.05	0.11	0.10	0.18	1.00	0.10
SR (L2)	-0.08	0.04	-0.17	0.10	0.11	0.03	0.08	0.08	0.14	0.10	1.00
Hit on track E (L7)	-0.14	-0.07	-0.28	0.17	0.17	0.06	0.13	0.13	0.24	0.17	0.13
Hit on track E (L8)											1.00
Max strip E (L8)											
SR (L8)											
Strip E (L8)											
ACC											
Clusters Y											
Clusters X											
Max strip E (L7)											
Max strip distance (L8)											
Strip E (L7)											
SR (L2)											
Hit on track E (L7)											

approach: FCNN, trained over diverse sources of charge sign confusion



identified
12 features:

+ contribution to data taking (shifts of 6days @ CERN POCC)
(8/11 shifts done in 2025)

PHeSCAMI PRIN2022

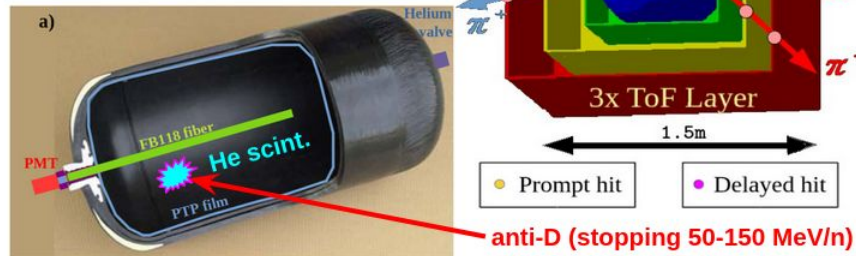
Study of a novel approach to search for anti-nuclei in CR (project sinergic to AMS-02)
(F. Nozzoli PI for TIFPA and P. Zuccon PI for UniTN. Project will end in February 2026)

"Pressurized Helium Scintillating Calorimeter for AntiMatter Identification"

new antimatter identification signature:

- delayed annihilation of anti-d and anti-p (known μ s metastable states in He)
- He is a good/fast scintillator

$\tau_{\text{fast}} < 5\text{ns}$ LightYield $\approx 10\text{ph/keV}$
(mass of particle measured from $E_k \beta$)

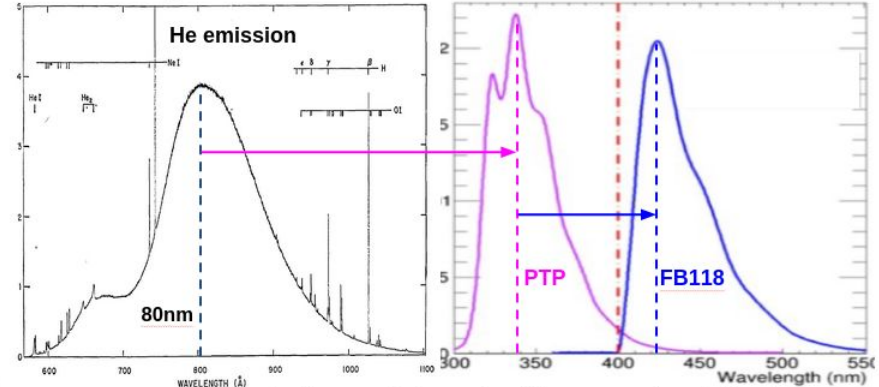


F. Nozzoli et al. <https://doi.org/10.3390/instruments8010003>

PHeSCAMI: Two-Stage WLS System

Approach (similar to LAr/DUNE): [C. Brizzolari et al. 2021 JINST 16 P09027](#)

1. PTP layer converts VUV (80 nm) $\rightarrow$ UV (330 nm)
2. FB118-doped PMMA fiber converts 330 nm $\rightarrow$ 430 nm (visible)



FB118: MMA doped with 2,5-Bis(5-tert-butyl-benzoxazol-2-yl)thiophene produced by Glass2Power Rovereto (TN) **Requirement: no scintillation**
(not obvious as EJ-286 WLS is also a scintillator)

We found that FB118 is a very efficient Cherenkov radiator and we plan to use it also in other astroparticle experiments.

Composizione preventivata AMS02 @ TIFPA

AMS02 gode della sinergia con la sigla AMBER

(CSN1 misura cross section p -bar di interesse astroparticle a CERN/SPS)

Battiston Roberto	0.15 + 0.15 da sinergia Amber
Francesco Nozzoli	0.3 + 0.15 da sinergia Amber
Paolo Zuccon	0.3 + 0.15 da sinergia Amber
Giordano Davide	0.2 + 0.15 da sinergia Amber (RTDA)
Francesco Rossi	0.5 + 0.15 da sinergia Amber (PhD al 3 anno)
Cavazzini Leo	0.5 + 0.15 da sinergia Amber (PhD al 3 anno)
Luigi E. Ghezzer	0.6 (PhD al 1 anno)
Puccetti Niccolo	0.3 (PhD al 1 anno)
Bisht Aziz	0.5 (ricercatore TD FBK)
Supportano il gruppo (ma con 0 FTE): F. Dimicoli, I. Lazzizzera, W. Burger.	

Totale: 3.35 FTE effettivi + 0.9 sinergici da AMBER

Pubblicazioni 2025:

- *“Properties of Cosmic Lithium Isotopes Measured by the Alpha Magnetic Spectrometer”*

Phys.Rev.Lett. 134 (2025) 20, 201001

- *“Antiprotons and Elementary Particles over a Solar Cycle: Results from the Alpha Magnetic Spectrometer”*

Phys.Rev.Lett. 134 (2025) 5, 051002

- *“Solar Modulation of Cosmic Nuclei over a Solar Cycle: Results from the Alpha Magnetic Spectrometer”*

Phys.Rev.Lett. 134 (2025) 5, 051001

- *“A novel approach for $\bar{\text{He}}$ research in cosmic rays with neural networks”*

PoS ICHEP2024 (2025) 747

Pubblicazioni PHESCAMI 2025:

- *“Prototyping a Pressurized Helium Scintillating Calorimeter for AntiMatter Identification”*

in publication on **Centr. Eur. Astr. Bull.**

- *“Development of a Pressurized Helium Scintillating Calorimeter for AntiMatter Identification”*

PoS EXA-LEAP2024 (2025) 048

- *“Perspectives for antideuteron search in Cosmic Rays with a helium pressurized calorimeter”*

Nuovo Cim.C 48 (2025) 3, 153

Richieste 2026 (ancora preliminare)

Missioni: 20k per turni al CERN

Altri servizi: 2.5k per veicolo al CERN