







PM2018-14th Pisa Meeting on Advanced Detectors



# Searching for a dark photon with PADME at LNF: status of the active diamond target

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## The target of the PADME experiment



\*Physics motivation and experiment layout discussed in detail in the poster: "The investigation on the dark sector at the PADME experiment".

 $e^+N \longrightarrow e^+N\gamma$ Bremsstrahlung on diamond Annihilation into 2 (or 3) SM photons  $\mathcal{L}^{\pm}\mathcal{L}^{-} \longrightarrow \gamma \gamma(\gamma)$ 

Low Z improves Signal/Background  $N(A'\gamma) \propto N(\gamma\gamma) \propto Z$  $N_{brem} \propto Z^2$ 



strips on the Y view, thanks to INFN Perugia.



Strip Y Front side 

Back side

using a dispensing system equipped with a syringe and precisely positionated with a micrometric

XYZθ handling system.

**Diamond with graphitic stips:** 

vias (through-holes), filled with a 2-component conductive adhesive from the back side, provide electrical connection of xstrips with PCB.

3025 E-solder EPOXY glue deposited with a syringe, monitoring online the electrical resistance of the contact  $(0.4-1 \Omega)$ .

### Back-end holes





Araldite AY 103-1 and HY 991 Diamond with metallic stips: Araldite 2011



## **Read out Front-End**



Diamond target inner board mounted and electrically connected (via connectors) to two **IDEAS** boards equipped each with a 16 channel **AMADEUS** chip to readout 16X+16Y strips. Complete target board connected to the vacuum tight flange with the final mechanical support.



#### Both detectors hold the High Voltage and IV curves measured: about +/-50nA at +/-150 V

## DCS and DAQ

- ✓ Remote control of each instrument
- ✓ Automatic channels calibration
- ✓ Software GUI based on ROOT
- ✓ DCS integrated with PADME DAQ
- Calibration data stored in MySqL LECCE database  $\checkmark$

## Summary

- Two Active Diamond Targets assembled: one with metallic strips and one with graphitic strips
- Active Diamond Target DCS and DAQ ready
- Mechanical support in vacuum ready
- Commissioning underway in Lecce INFN for final performance certification before the installation in the experimental hall

## References

- <sup>1</sup>M. Raggi and V. Kozhuharov, "Proposal to Search for a Dark Photon in Positron on Target Collisions at DADNE Linac," Adv. High Energy Phys., 2014;
- <sup>2</sup>G. Chiodini on behalf of Active Target PADME group, "The PADME experiment for dark mediator searches at the Frascati BTF", JINST 12 C02037;
- <sup>3</sup>G. Chiodini on behalf of Active Target PADME group , "A diamond active target for the PADME experiment", JINST 12 C02036;
- <sup>4</sup> The Active Target PADME group, "Performance of the diamond active target prototype for the PADME experiment at the DAD BTF", NIM A 898 105–110 (2018).