Production of a thin diamond target by LASER for HESR at FAIR

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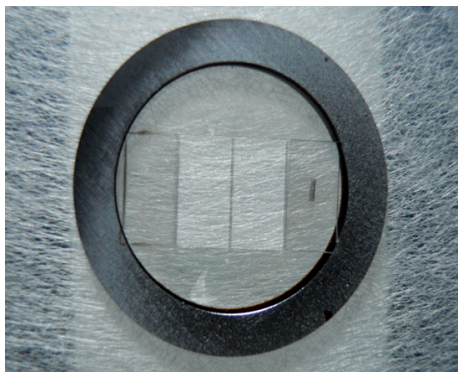
In the future hadron facility FAIR, the HESR ring will supply antiprotons in the momentum range 1.5-15 GeV/c as projectiles for charm, strangeness and F.F physics.
For all the reactions it will be necessary to use internal targets and in particular, for the double strangeness production, the most fruitful target nucleus is ^{12}C[1].
Inserting a solid target inside an antiproton ring creates two main problems: a large background on the detectors due to the overwhelming amount of annihilations and a strong depletion of the beam due to all the hadronic interactions of the antiprotons with ^{12}C. The width of the target plays a crucial role in minimizing these unwanted effects.



Two wire prototypes 100 μm wide, 3 μm thick and 11 mm high have been already realized. One of them is shown in the figure.
Starting from a thin diamond disk produced by CVD technique, the wire shape has been obtained by cutting the diamond using a FEMTO-EDGE LASER of 1064 nm wavelength.
One prototype has been submitted to irradiation by protons of 1.5 MeV and simultaneously controlled by Proton Back-Scattering technique, in order to test:

a) The impurity level,
b) The surface ^{12}C density,
c) The radiation hardness and
d) Eventual phase modifications during irradiation.

Moreover, it has been submitted to Micro-Raman spectroscopy in order to scan the carbon phases along the width.
The results show performances that satisfy the requirements of mechanical resistance and thermal and electrical conductivity. They will be illustrated in details in the talk.

References

[1] F.Ferro et al., *Nucl. Phys.*, 2007, **A789**, 209