

Preparation and characterisation of a thin target for a nuclear physics experiment

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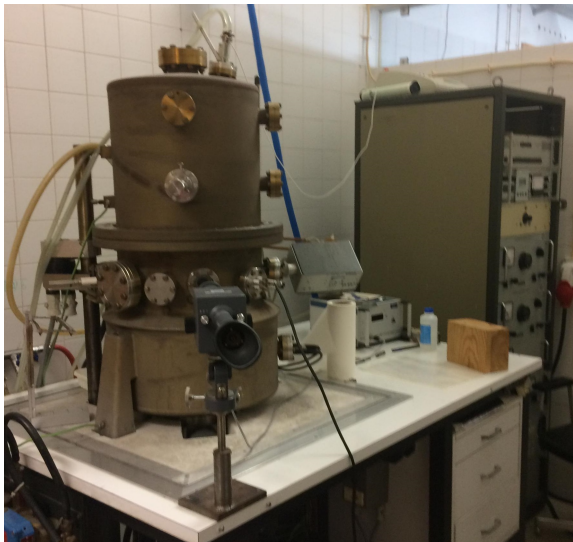
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Introduction

- Targets used in nuclear experiments are subjected to bombardment by particles or radiation;
- Important aspects of targets:
 - uniform thickness
 - good mechanical strength
 - stability
 - chemical and isotopic purity¹

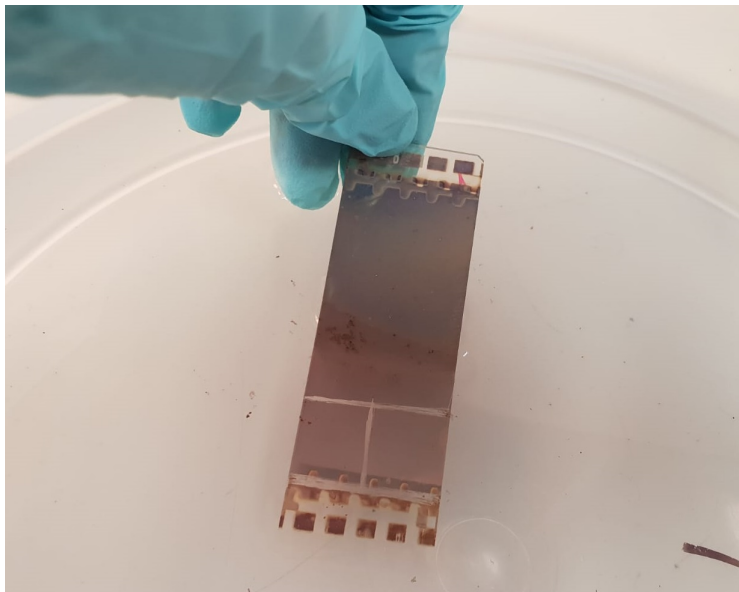
¹Anna Stolarz. "Target preparation for research with charged projectiles". In: *Journal of Radioanalytical and Nuclear Chemistry*. 2013; A. H. F. Muggleton. "Deposition techniques for the preparation of thin film nuclear targets". In: *Vacuum* 37 (Jan. 1987).

Vacuum evaporation



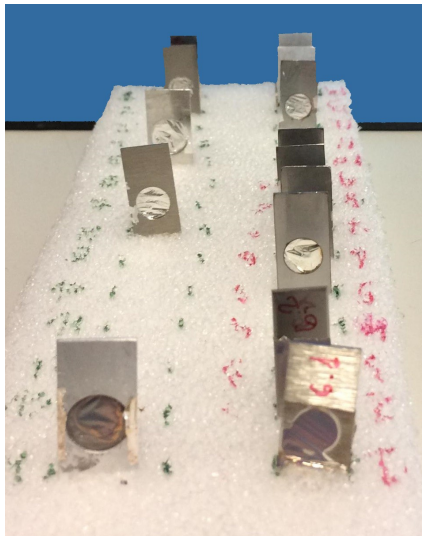






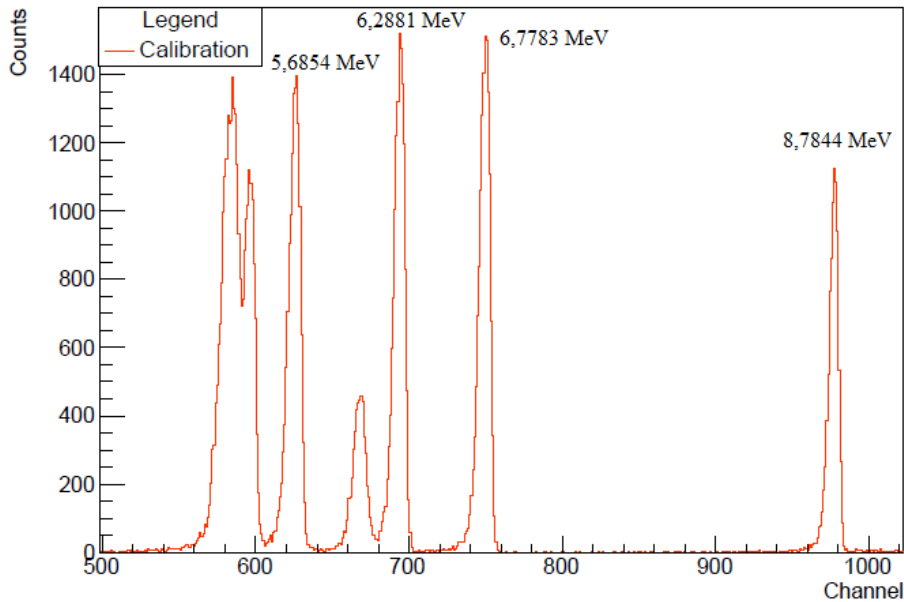
Production of the targets

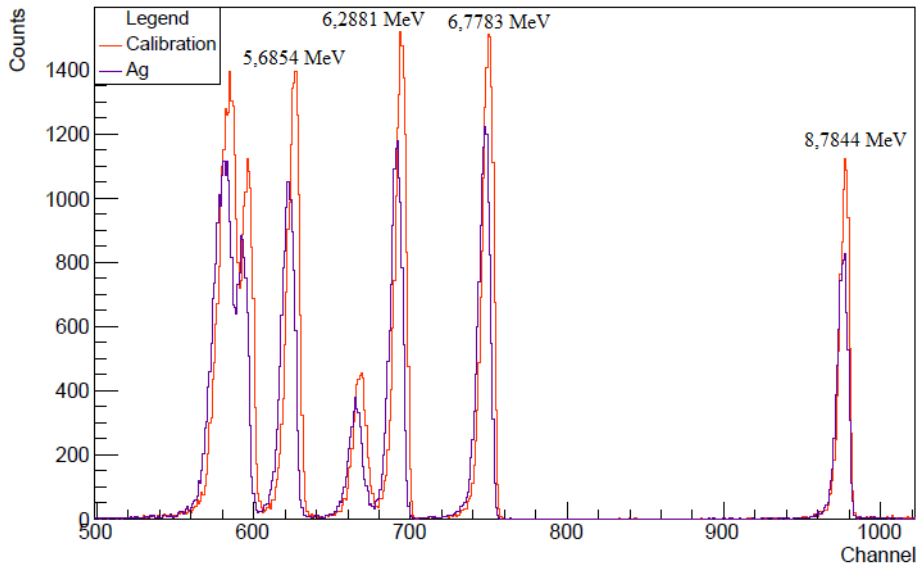
- The targets consist of AgCl on Ag support;

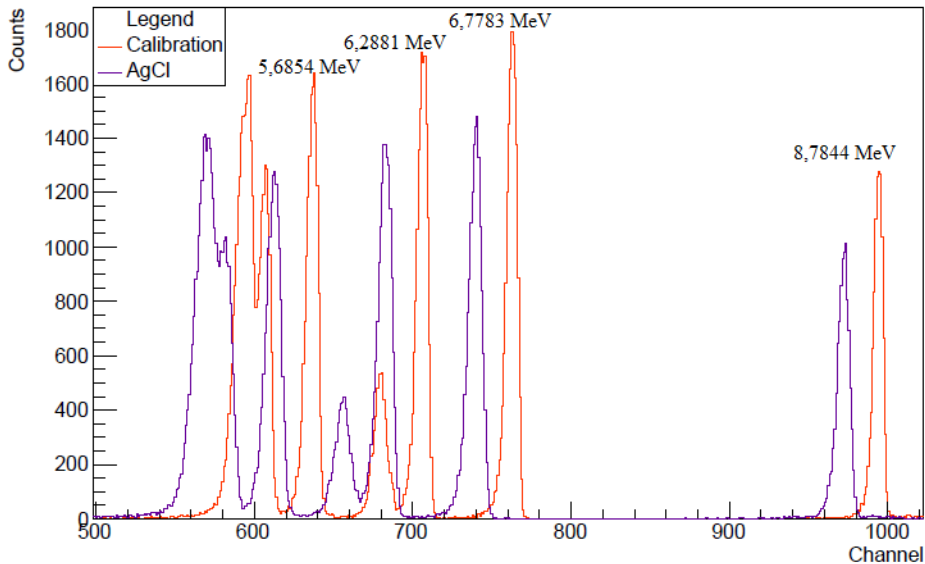


Alpha-particle analysis







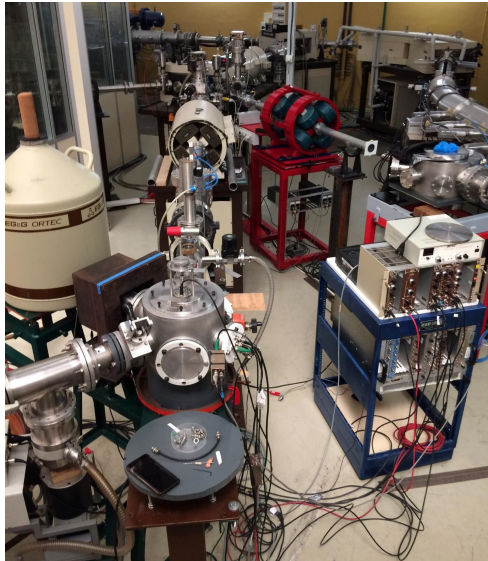


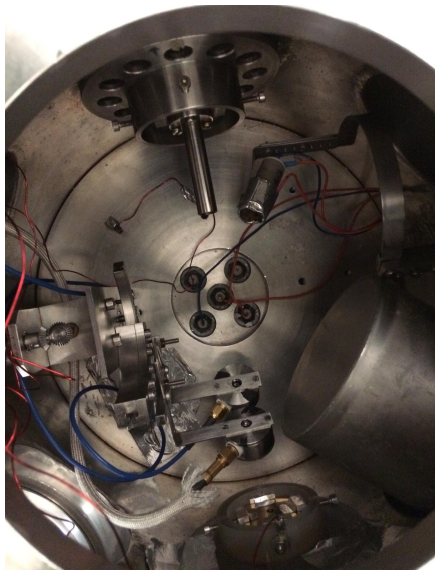
AlfaMC Program²

| Layer | Thickness (μm) |
|-------|-----------------------|
| Ag | 0.04 |
| AgCl | 2.67 |
| Total | 2.71 |

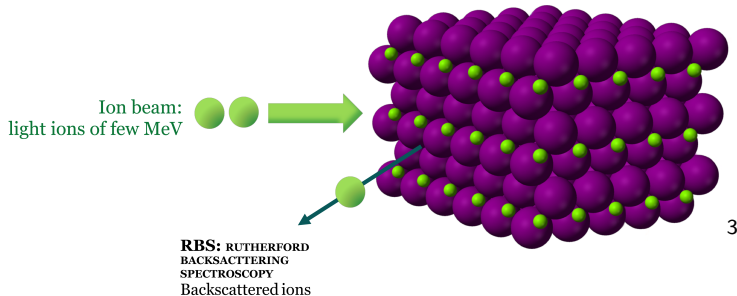
²Luis Peralta and Alina Louro. "AlfaMC: A fast alpha particle transport Monte Carlo code". In: *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* 737 (2014).

The CTN experiment



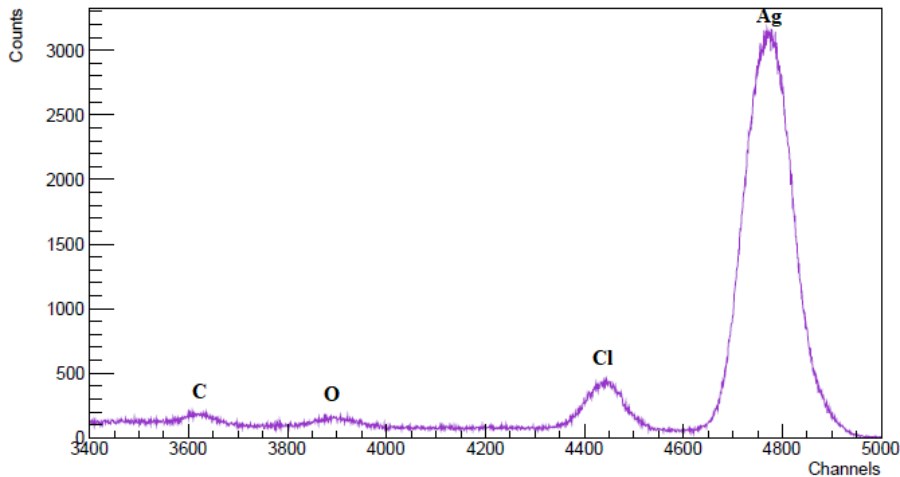


Rutherford Backscattering Spectrometry



Results from the experiment

$$E_p = 3014 \text{ keV}$$



Summary

- Several AgCl targets were made using the vacuum evaporation technique;
- For one of these targets the thickness of the different layers was estimated, using alpha-particle analysis and the AlfaMC code;
- The targets were used in a nuclear physics experiment at CTN;
- For the same target its constituents were identified using the data from RBS analysis.