



UA9 crystal collimation workshop

Fabrication and characterization of thin crystals for channeling experiments on H8 line

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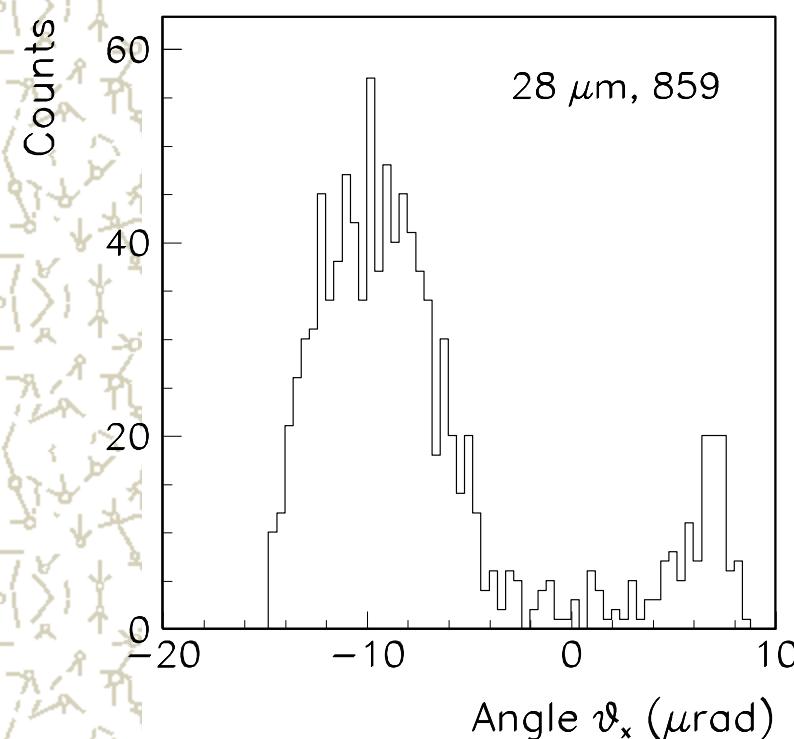


Outlook

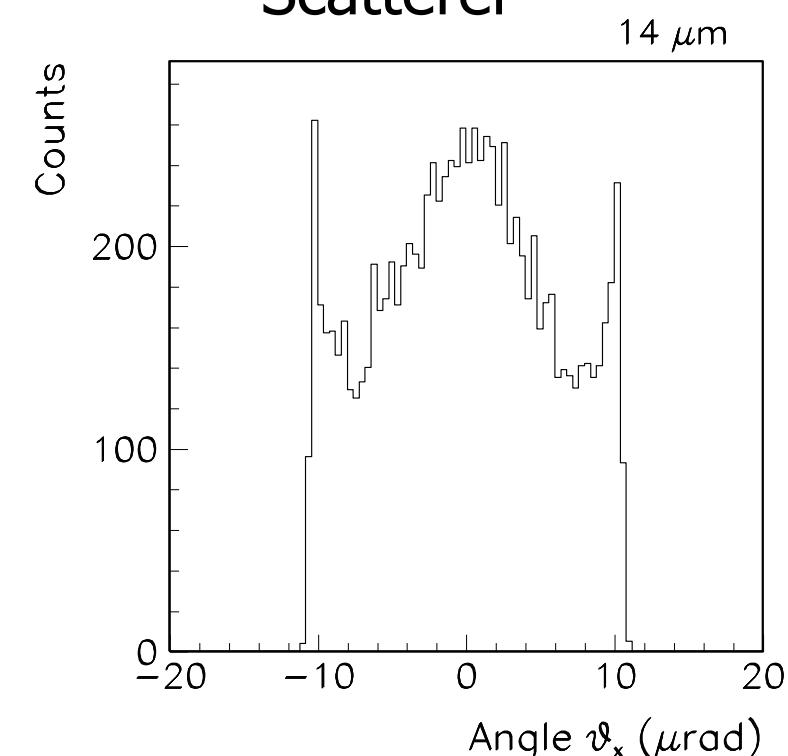
- Thin crystals
- Crystal fabrication
- Crystal characterization
- Conclusions

Thin crystals

Mirror



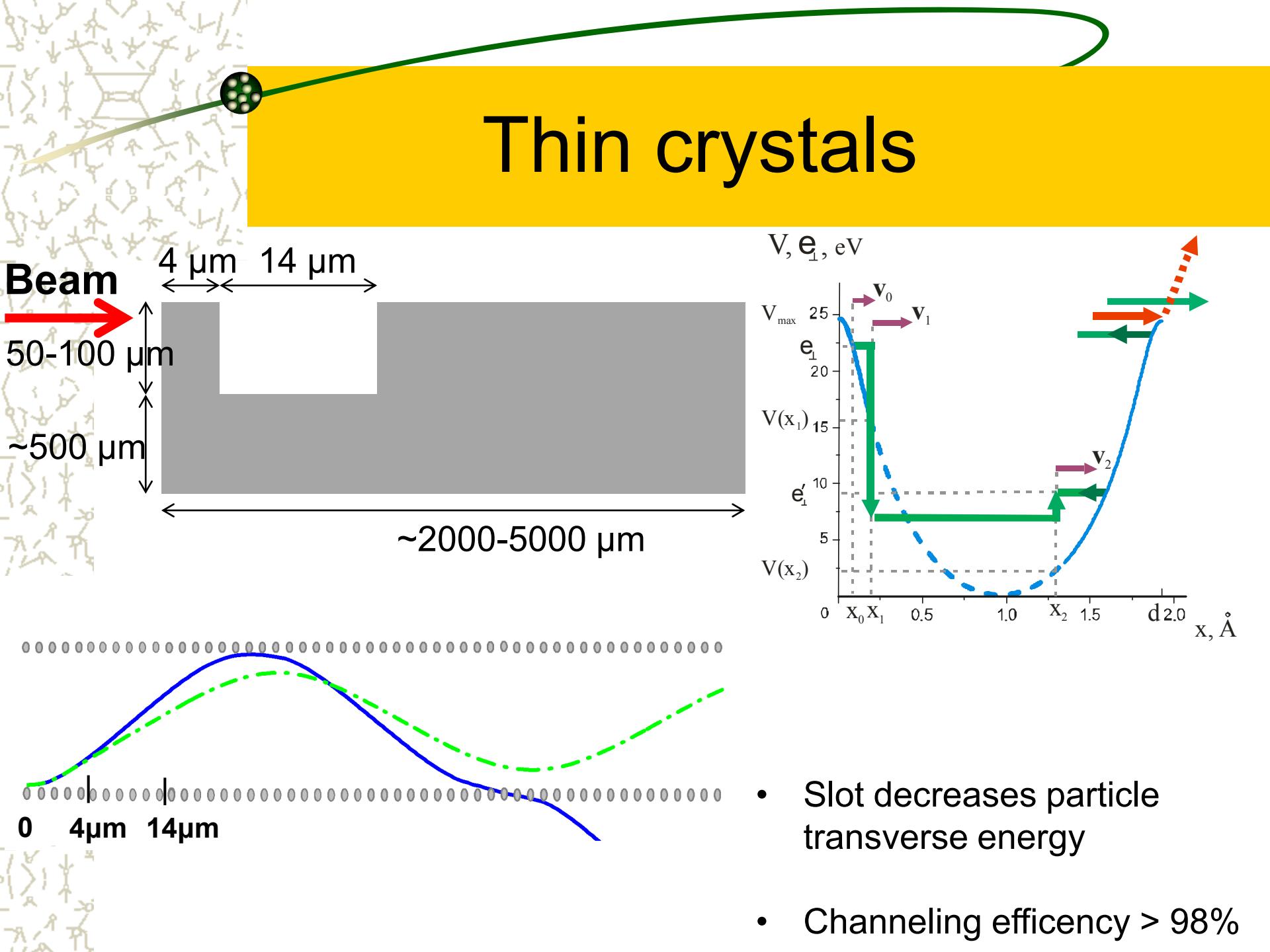
Scatterer

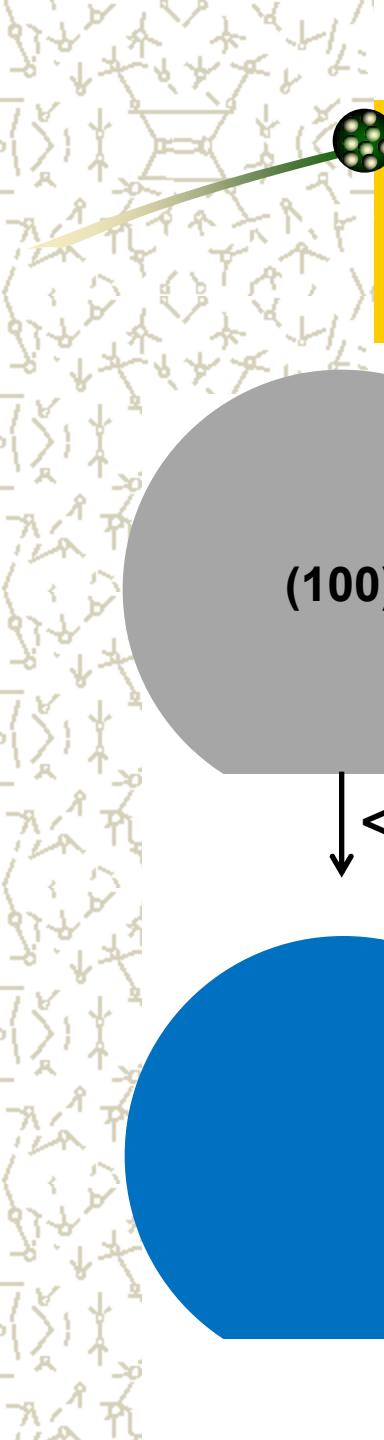


- Not bent crystal, thickness 28-30 μm (about $\lambda/2$)

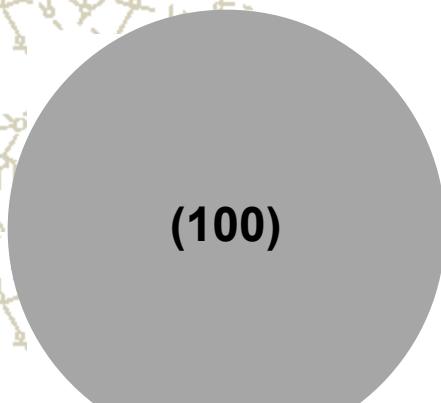
- Not bent crystal, thickness 14-16 μm (about $\lambda/4$)

Thin crystals



A detailed diagram of a silicon crystal lattice, showing a repeating pattern of diamond-shaped units with internal nodes and arrows indicating lattice vectors.

Crystal fabrication

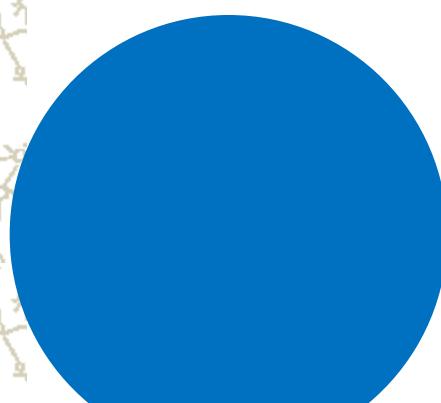


(100)

↓
<110>

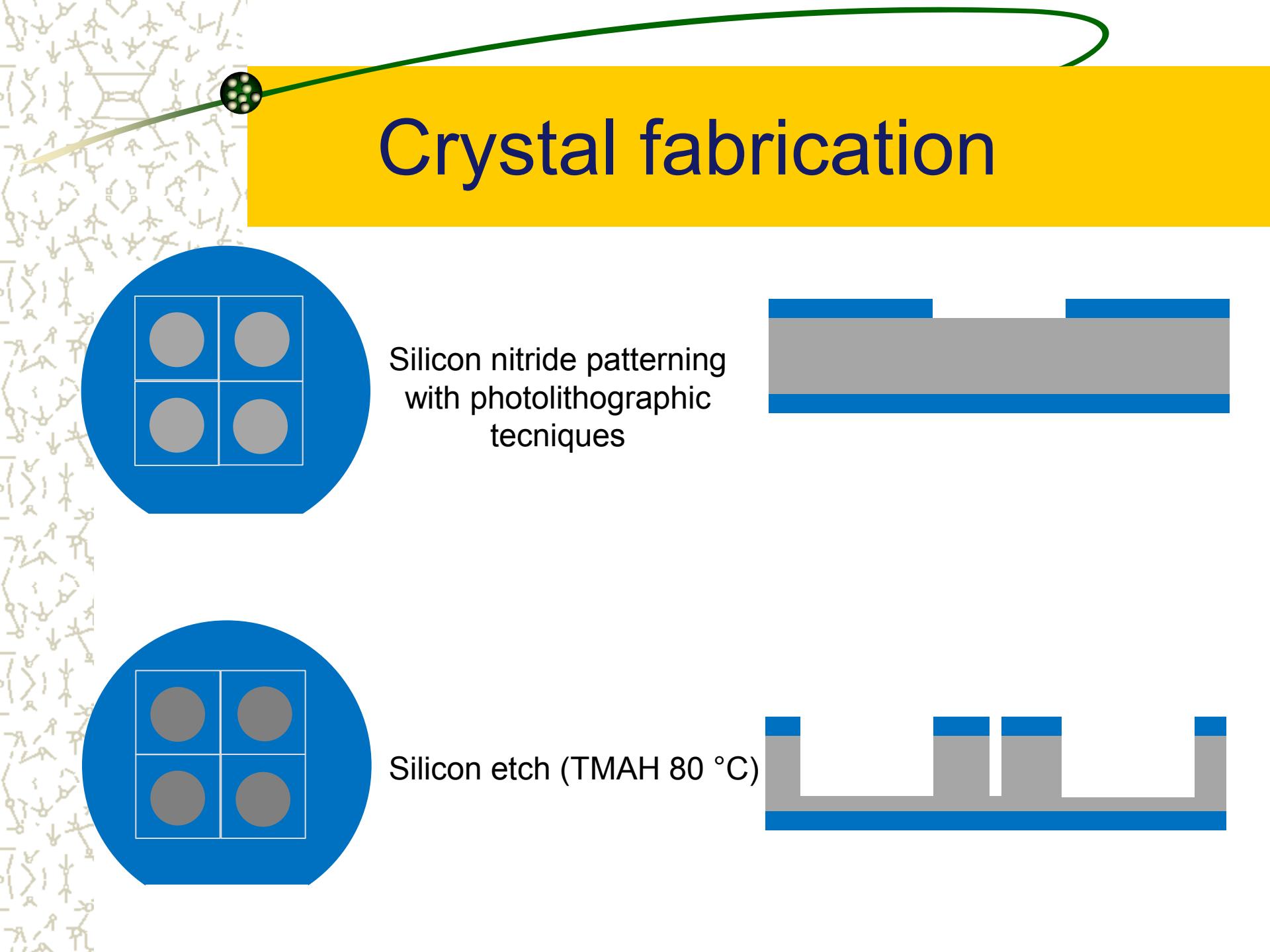
Starting material:

- (100) Silicon wafers
- TTV < 1 μm

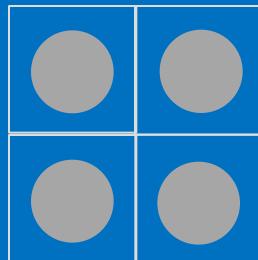


LPCVD of 100 nm super
low stress silicon nitride

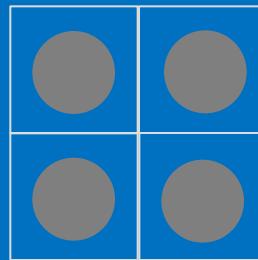




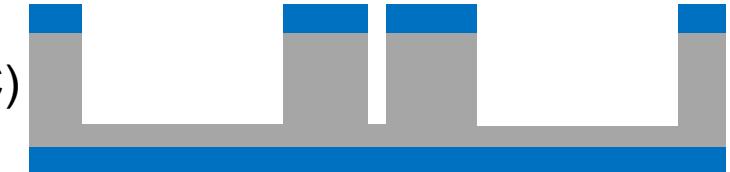
Crystal fabrication



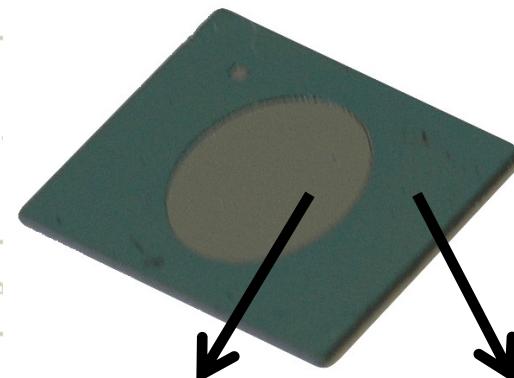
Silicon nitride patterning
with photolithographic
techniques



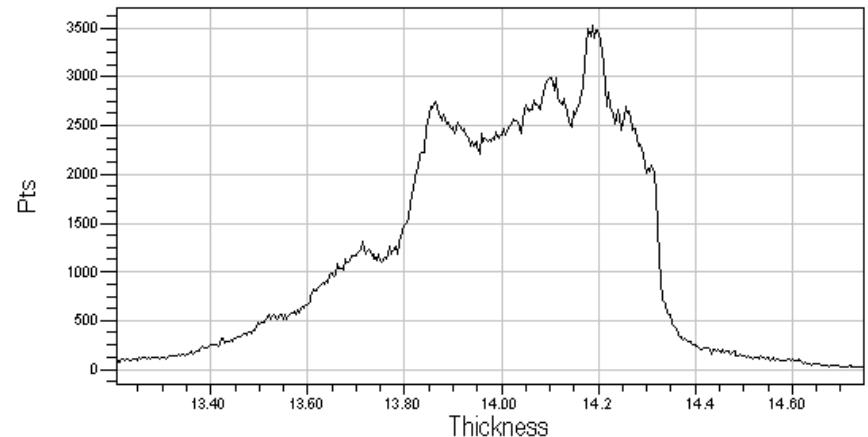
Silicon etch (TMAH 80 °C)



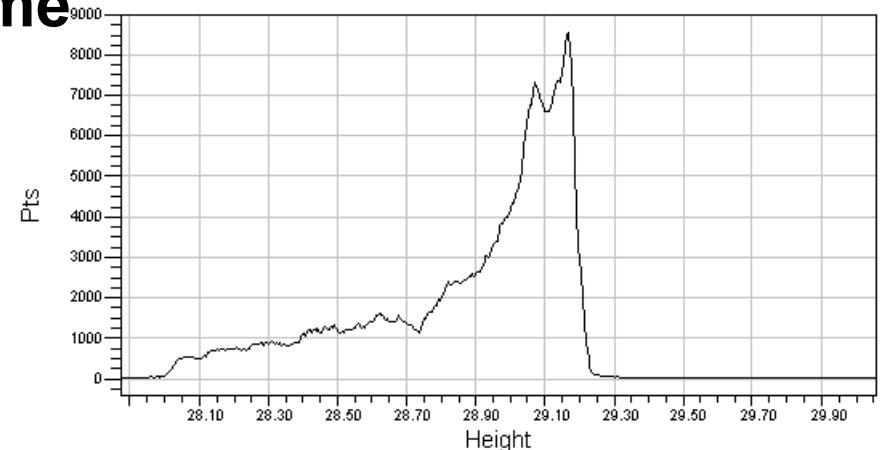
Crystal Characterization



**Thin
Membrane
(14 or 29 μm)**

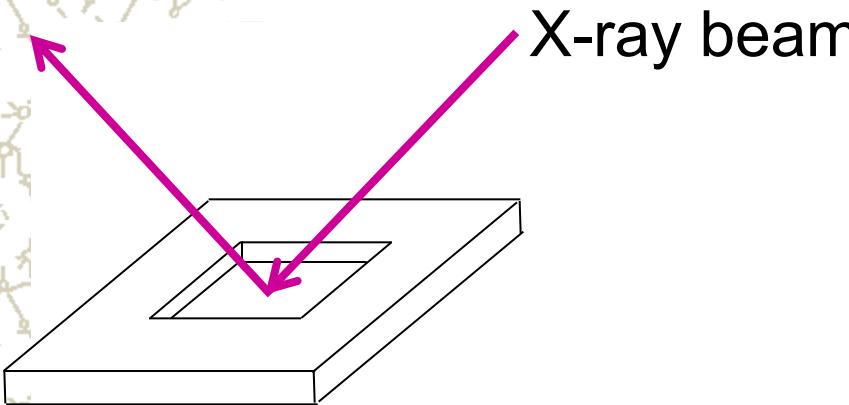


80% of membrane
has thickness
between 13.75 and
14.32 μm
(pv: 0.57 μm)

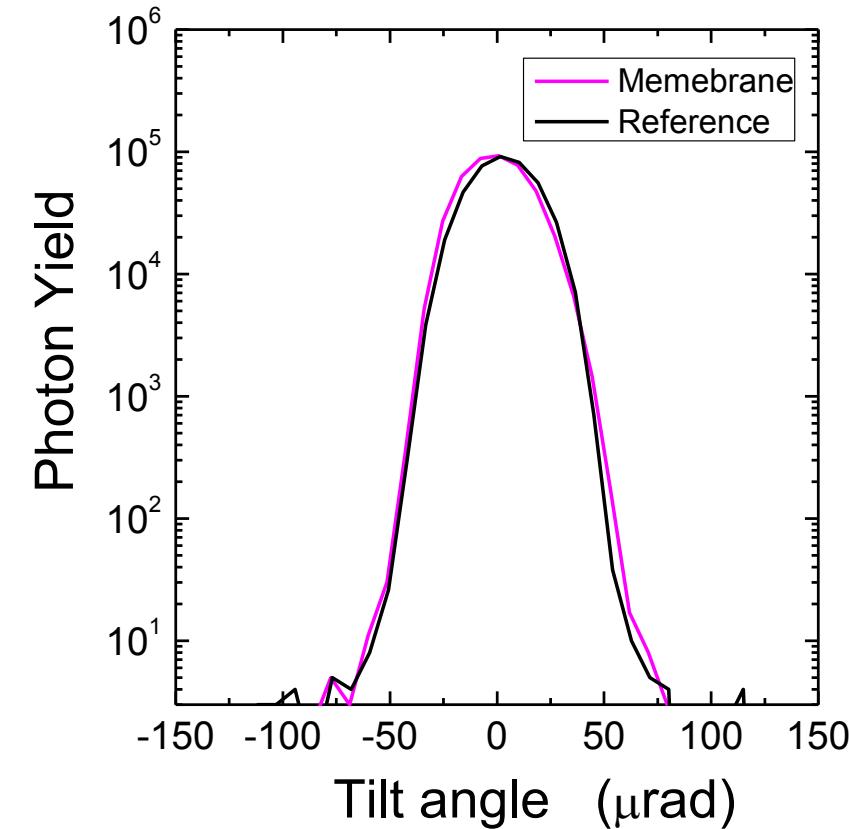


80% of membrane
has thickness
between 28.75 and
29.21 μm
(pv: 0.46 μm)

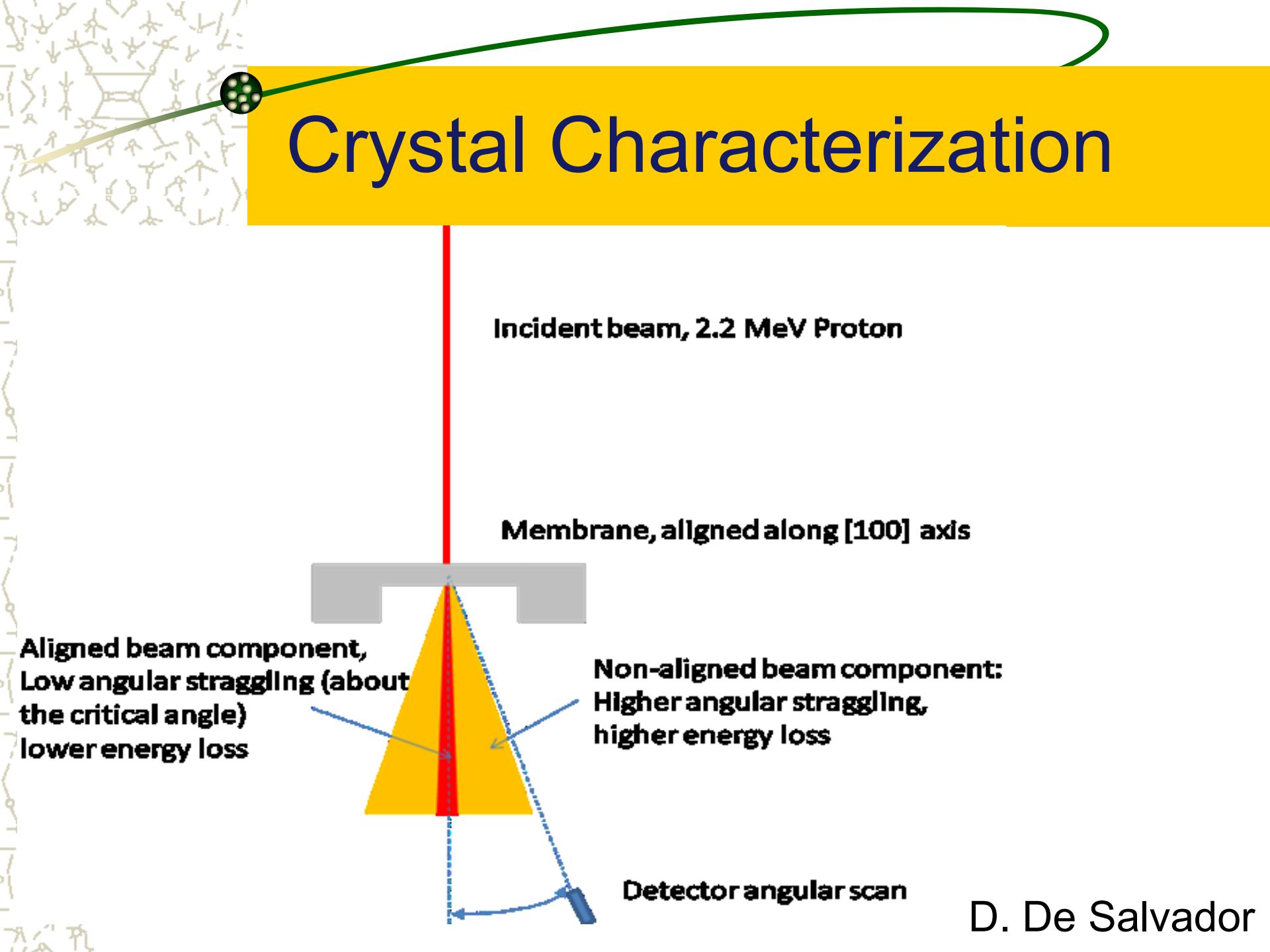
Crystal Characterization



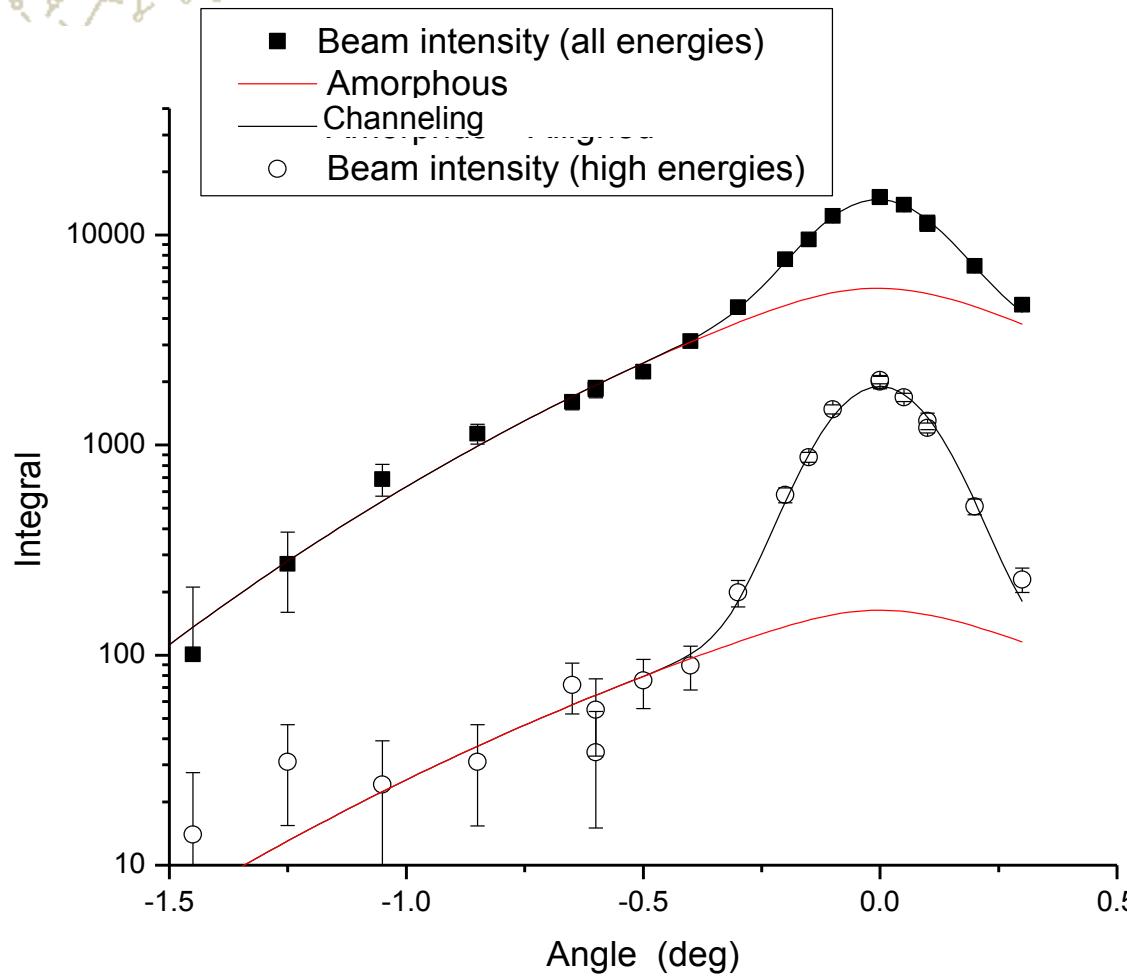
- HRXRD Rocking curve on the membrane is the same as the one on a reference crystal
(D. De Salvador)
- The frame assures no membrane deformations and allows easy crystal handle



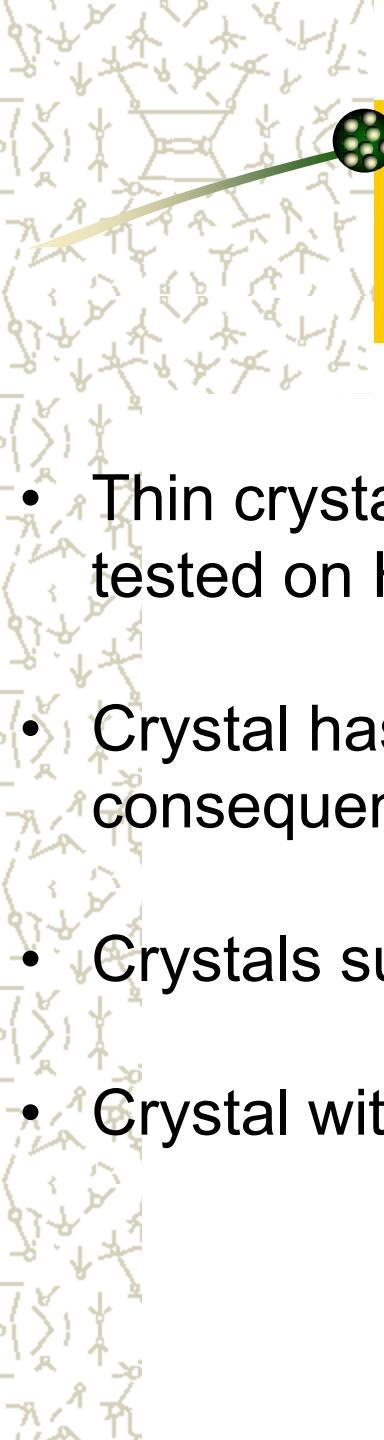
Crystal Characterization



Crystal Characterization



Very preliminary,
D. De Salvador



Conclusions

- Thin crystal of thickness 29 and 14 μm ready to be tested on H8 line
- Crystal has zero stress or deformations arising as consequence of mounting
- Crystals successfully tested with 2MeV proton beam
- Crystal with slot under preparation