CTE measurements

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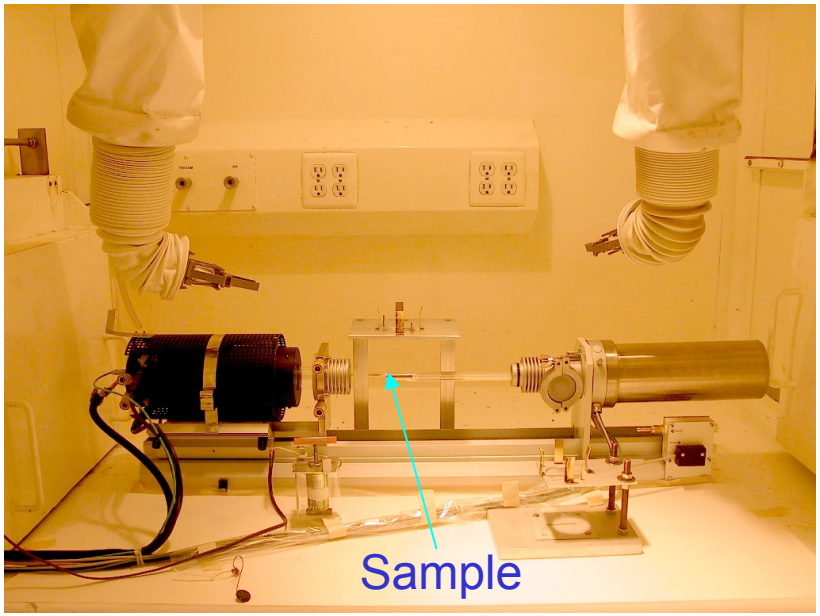
Introduction

High intensity p beam

⟹ New material & design for targets

⟹
- Mechanical strength ⟸ Nick's work
- Low coefficient of thermal expansion (CTE) ⟸ This talk
- High thermal conductivity ⟸ Future measurement ?

Setup & Data acquisition

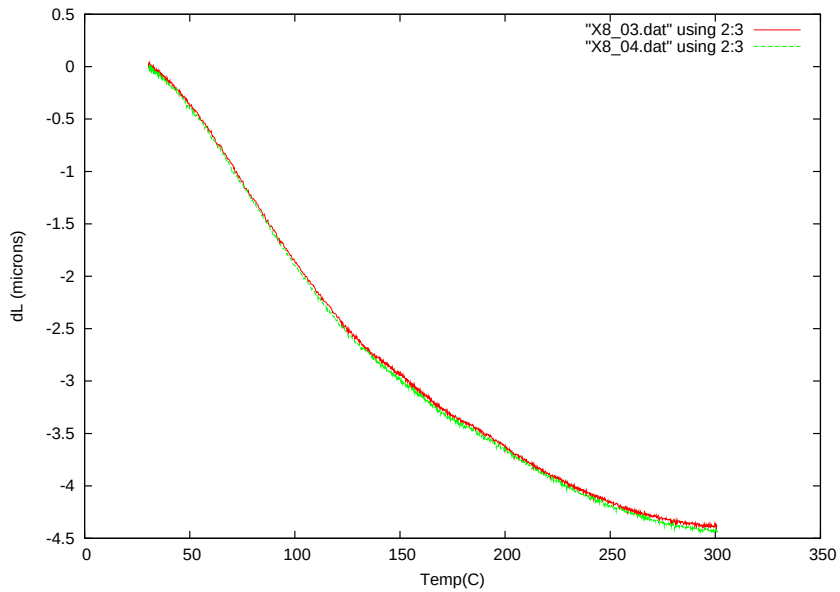


Dilatometer inside the hot cell

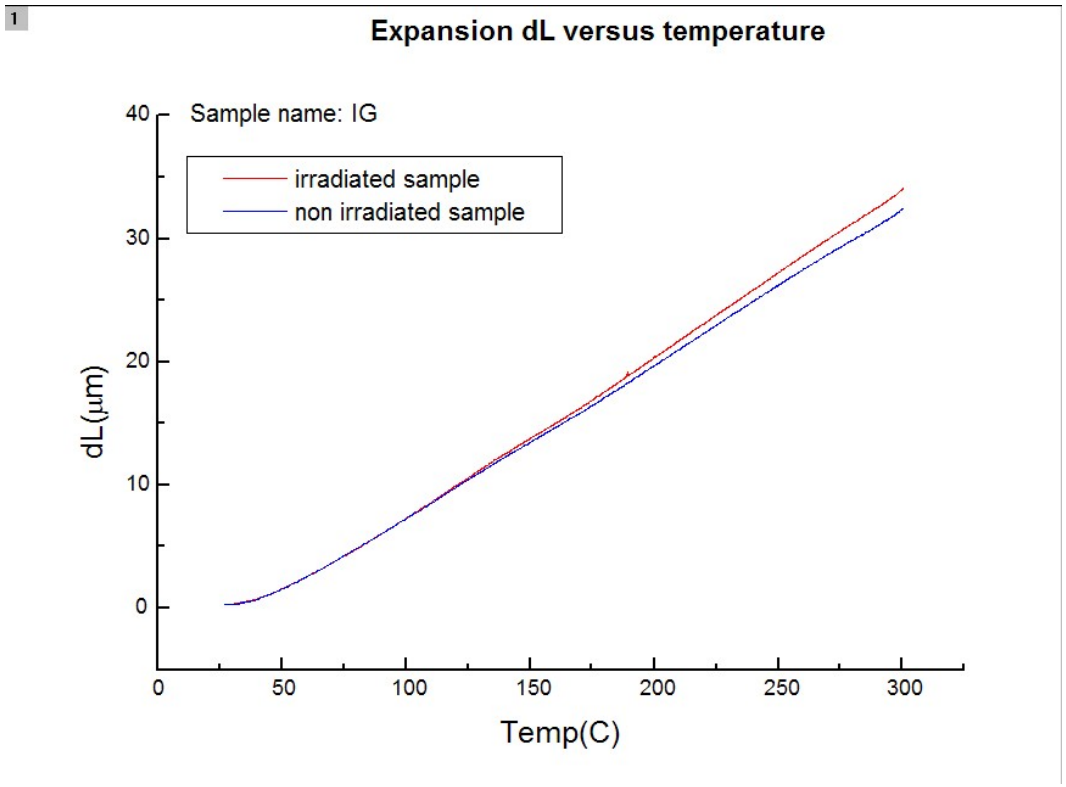
Samples
- Irradiated
- Non-irradiated

CTE measurement: measure temp and length simultaneously

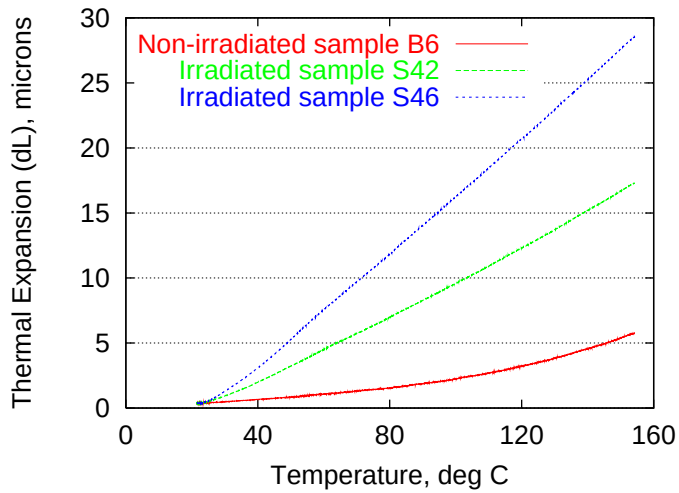
- Temperature range: 30^0C - 300^0C
- 4 consecutive measurements for each sample



Thermal expansion of graphite

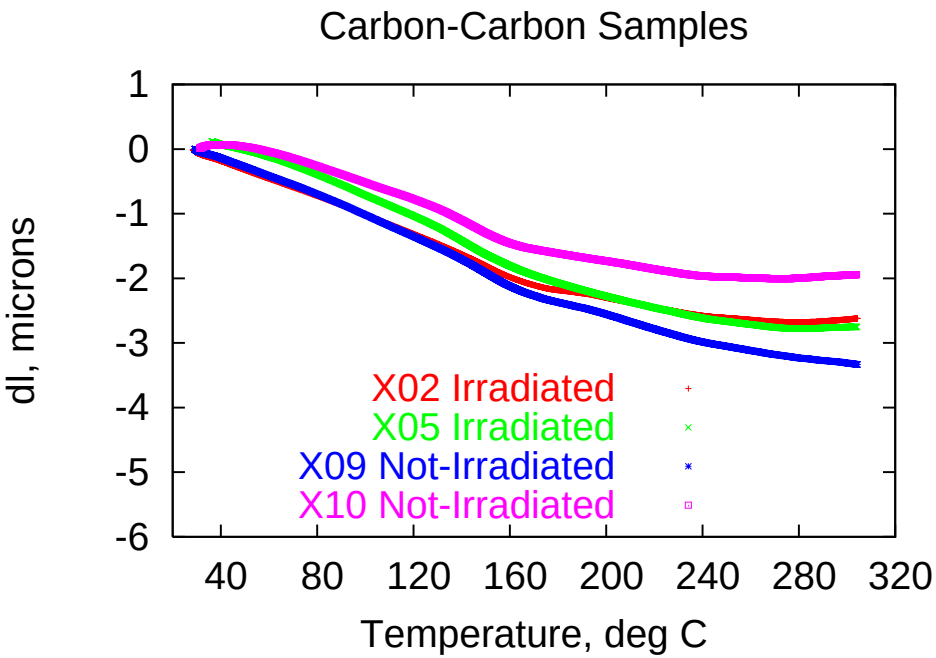


Thermal “expansion” graphite sample

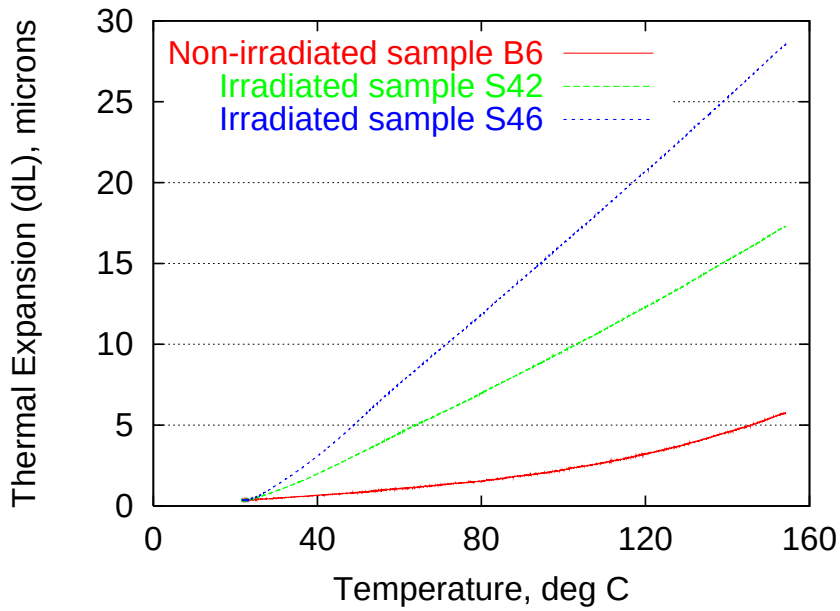


Thermal expansion invar sample

Thermal expansion of carbon-carbon

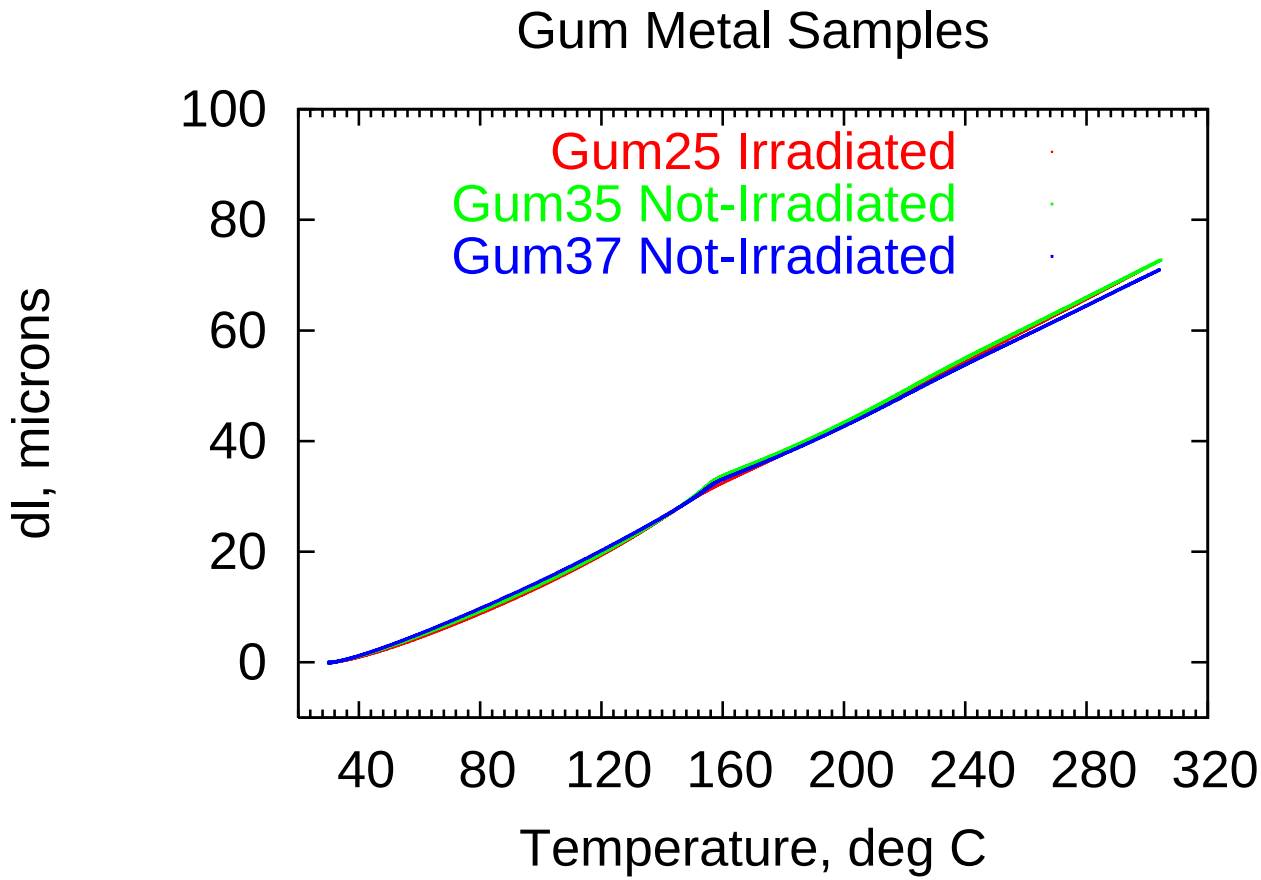


Thermal "expansion" carbon-carbon samples

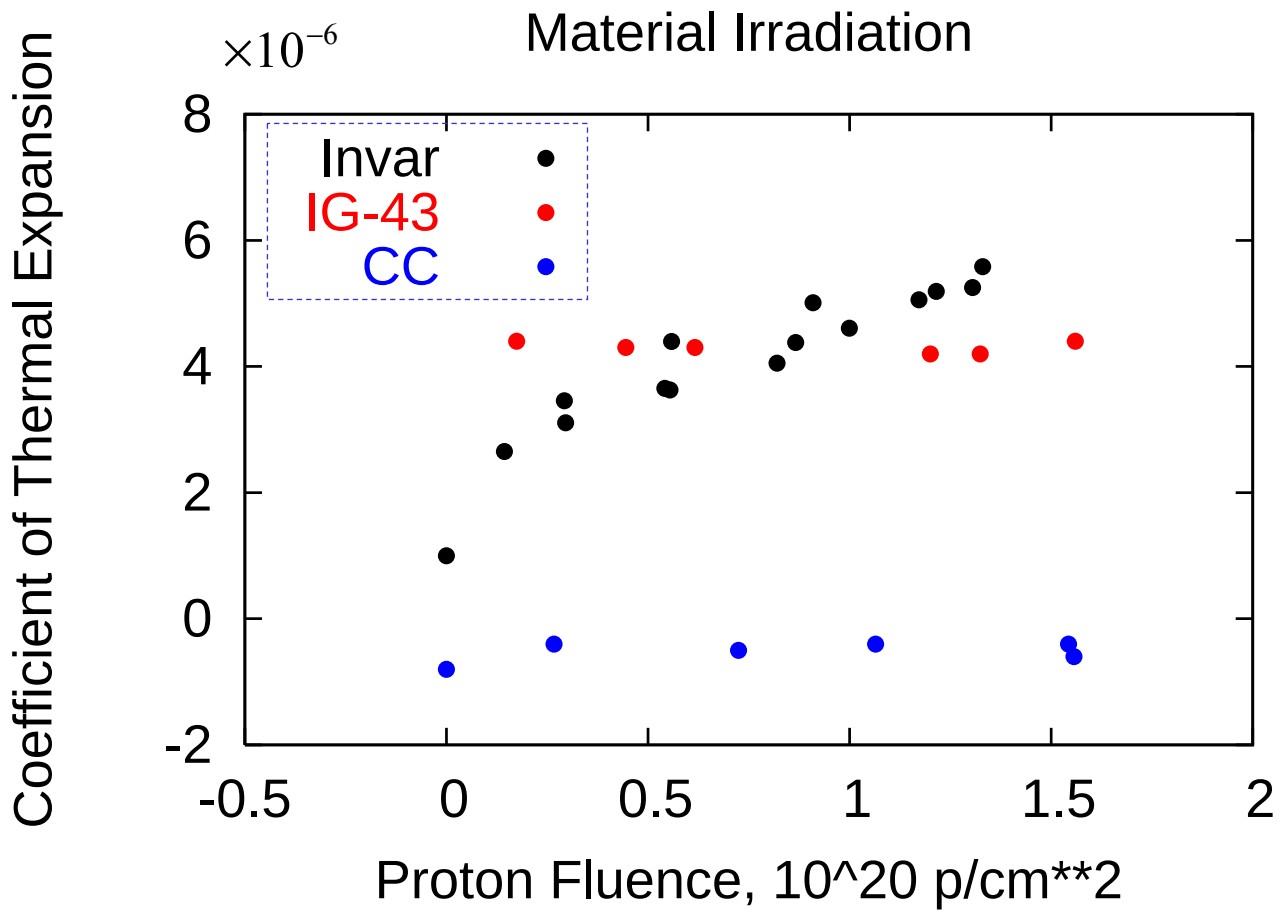


Thermal expansion invar samples

Thermal Expansion of Gum Metal



Coefficient of thermal expansion



Conclusion

- CTE's for carbon-carbon, graphite and Gum metal do not change appreciably as a result of irradiation.

What's next ?

Go to higher temperature 600^0C – 800^0C

Vacuum or inert gas