#### First surface profile scan with thermo-cycled graphite targets

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Targets provided by S.Corradetti (LNL) :

- 2 graphite disks: thickness 1 mm, radii 1.5 and 2.0 cm
- Machine cut @LNL in 2017 from graphite cylinders POCO EDM 3
- Both thermo cycled ~ 5 times in vacuum: Tmax ~ 1500 °C in the center (~1100 °C on the edges)
- Thermal conductivity measured (optimal function well reproduced)





# The targets

**Target 1** - Ø 3 cm



**Target 2** - Ø 4 cm



Selected 3 areas 1 (horizontal) x 2 (vertical) mm<sup>2</sup> on each disk

Each area scanned along 10 horizontal paths, vertically spaced by 0.2 mm

#### **Profilometer device**

Tencor P-7 profilometer

Height resolution ~ few nm

supports 2D and 3D measurements of step heights, roughness, bow, and stress

Present measurement used a stylus with 2  $\mu$ m radius



### **Target 1 measurement**

10 profile scans averaged per each selected area

«Roughness» calculated for each area

Used 2 equivalent roughness definitions: R<sub>a</sub> and R<sub>a</sub>

deep observed in the center: 0.5 mm wide, 10 μm deep Roghness quite small



 $R_a = (630.26 \pm 77.85) \text{ nm}; R_q = (815.47 \pm 113.42) \text{ nm}$ 

 $R_a = (1488.01 \pm 31.51) \text{ nm}; R_q = (1848.93 \pm 354.08) \text{ nm}$ 

 $R_a$ = (660.55 ± 87.23) nm;  $R_q$ = (848.72 ± 108.94) nm

## **Target 2 measurement**

10 profile scans averaged per each selected area

«Roughness» calculated for each area

Used 2 equivalent roughness definitions: R<sub>a</sub> and R<sub>a</sub>

- No deeps observed
- no significant differences between center and edges
- Roughness much higher than target 1



 $R_a$ = (1833.15 ± 309.96) nm;  $R_q$ = (2257.07 ± 366.01) nm

 $R_a = (1762.39 \pm 185.92) \text{ nm}; R_q = (2009.78 \pm 245.10) \text{ nm}$ 

 $R_a = (1367.19 \pm 200.39) \text{ nm}; R_q = (1737.16 \pm 244.17) \text{ nm}$ 

### **Comments and next steps**

- Origin of the deep in the center of target 1 to be understood (machining procedure?)
- Possibly target 2 has similar deep on opposite side
- Plan to make some complete scans over few diameters, to study overall waveness
- Plan to perform a 2D scan
- Need a roghness calibration: don't know its size at target production
- thinner stylus (radius 200 nm) being ordered, for future finer measurements