Analysis of structures run at SLAC.

Irises of Mo.
Introduction.

- **Background:**
  - Iris-in-copper-disc structures.
  - Run in SLAC, compared to CTFII runs
    - at 11 GHz.
    - longer pulses, 300 ns
  - Showed slow conditioning, max. surface field was 140 MV/m.
- **Materials:**
  - Mo, fired at 800 ºC.
  - Structure filled before operation with 1 bar N₂ at 120 ºC.

- **Analyses:**
  - Surface SEM + EDS for first and intermediate cavities.
  - Compared to Mo structure run in CTFII.
Contents.

- Intro.

- Surface modifications.
  - Overview.
  - Comparative SLAC/CTFII Mo structures.
  - Comparison of different irises along the structure.
  - Comparison of different radial positions within one iris.

- Original Roughness of ground flat surface.

- Other issues.
Surface modifications.
Overview.

50x

1st

400 µm

mid

1000x

20 µm

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Surface modifications.
Overview.

SLAC 1st

CTFII Mo 1st

CTFII Mo Mid

Reminder from CTFII structures
Surface modification in tip region. Comparison $1^{st}$/mid-position and SLAC/CTFII.

First $\text{Cu}$ cavity run in CTFII. Presentation of 12/04/2001.

First $\text{W}$ iris run in CTFII. Presentation of 19/11/2001.
Surface modification.
Comparison 1\textsuperscript{st}/mid-position and SLAC/CTFII.

SLAC 1\textsuperscript{st}

SLAC mid

CTFII Mo 1\textsuperscript{st}

CTFII Mo mid

1000x 20 \textmu m
Surface modification.
Comparison SLAC/CTFII.

SLAC 1st

CTFII Mo 1st

5000x

5 µm
Surface modification.
Comparison along structure.

Matching

100 µm

200x

1000x

1st

2nd
Surface modification in tip region. Comparison at different positions in 1st iris.
Surface modification in tip region of irises.

- Surface modifications are marginal in general, no severe metal loss.
  - Even lower than previous CTFII Mo structure.
  - Smaller than machining roughness.

- 1st iris more severe modifications than mid-position irises.

- Features:
  - Smoothened surface: starts in first iris, very limited in mid-position one.
  - Craters and clusters of craters: mainly in 1st irises.
  - Crests: none or just incipient.
  - Cracks: very limited.
Original roughness of ground flat surface. First iris.
Original roughness of ground flat surface. Comparison SLAC/CTFII irises.
Original roughness of ground flat surface.

- Original ground flat surfaces (regardless the effect of run).
  - Roughness apparently higher than in CTFII irises.
  - Si- and C-rich particles embedded, as in CTFII irises.
Other issues.

1. The toroidal surface presents numerous machining defects.

2. Macroscopic visible black tracks in matching iris. They contain Al, they might be due to wrapping in aluminum foil. The surface does not present any morphology difference.

3. Dark spots in some copper surfaces. They are very superficial, SEM and EDS do not reveal differences from the bulk. They can be related with the presence of pollution particles.