

# **Failure Analysis of Failed PMTs**

## **Progress report**

Charles He, Len Wang/Swales

Mark McLendon and Marjorie Sovinski/541

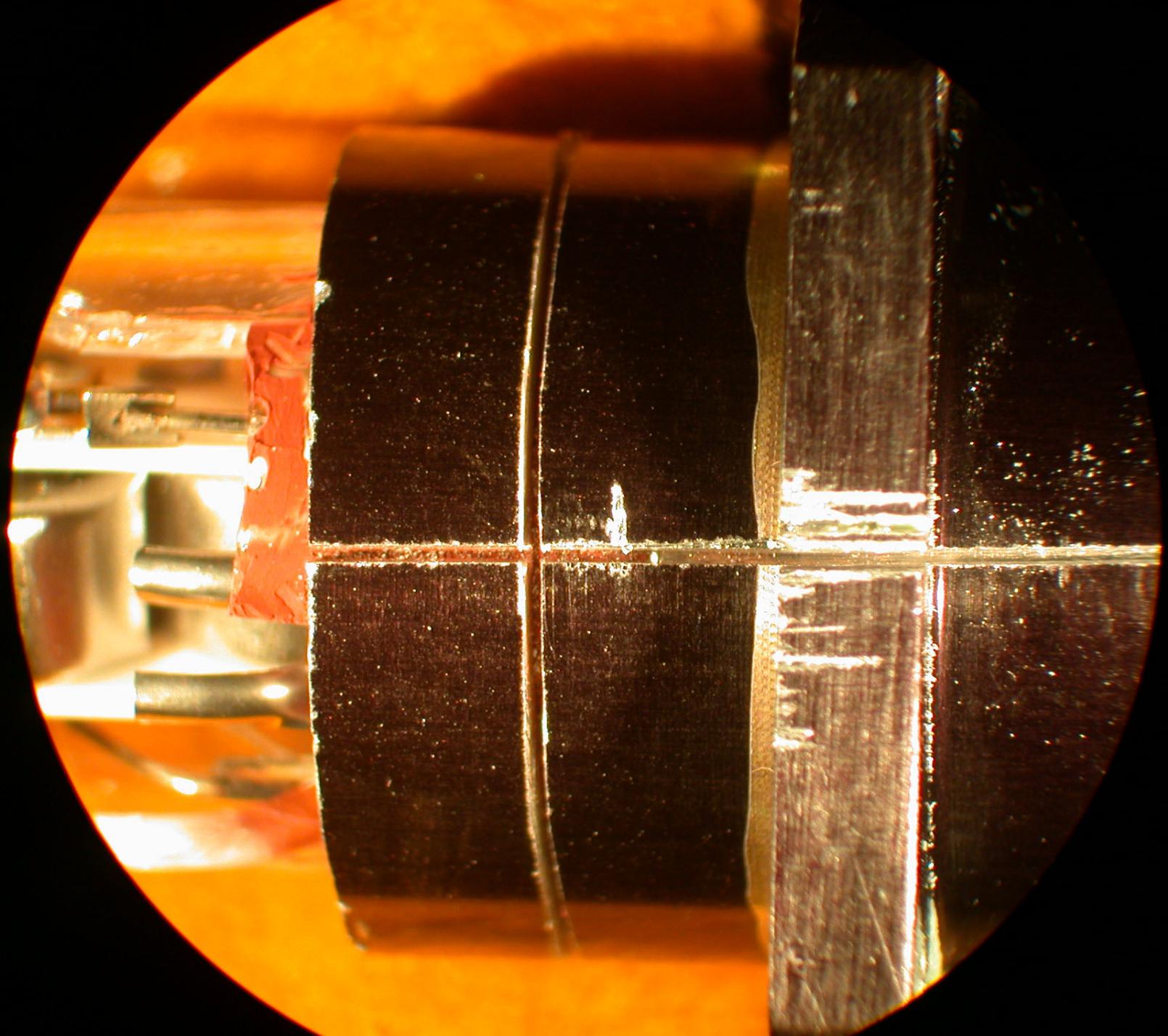
Walt Thomas/302

7-15-04

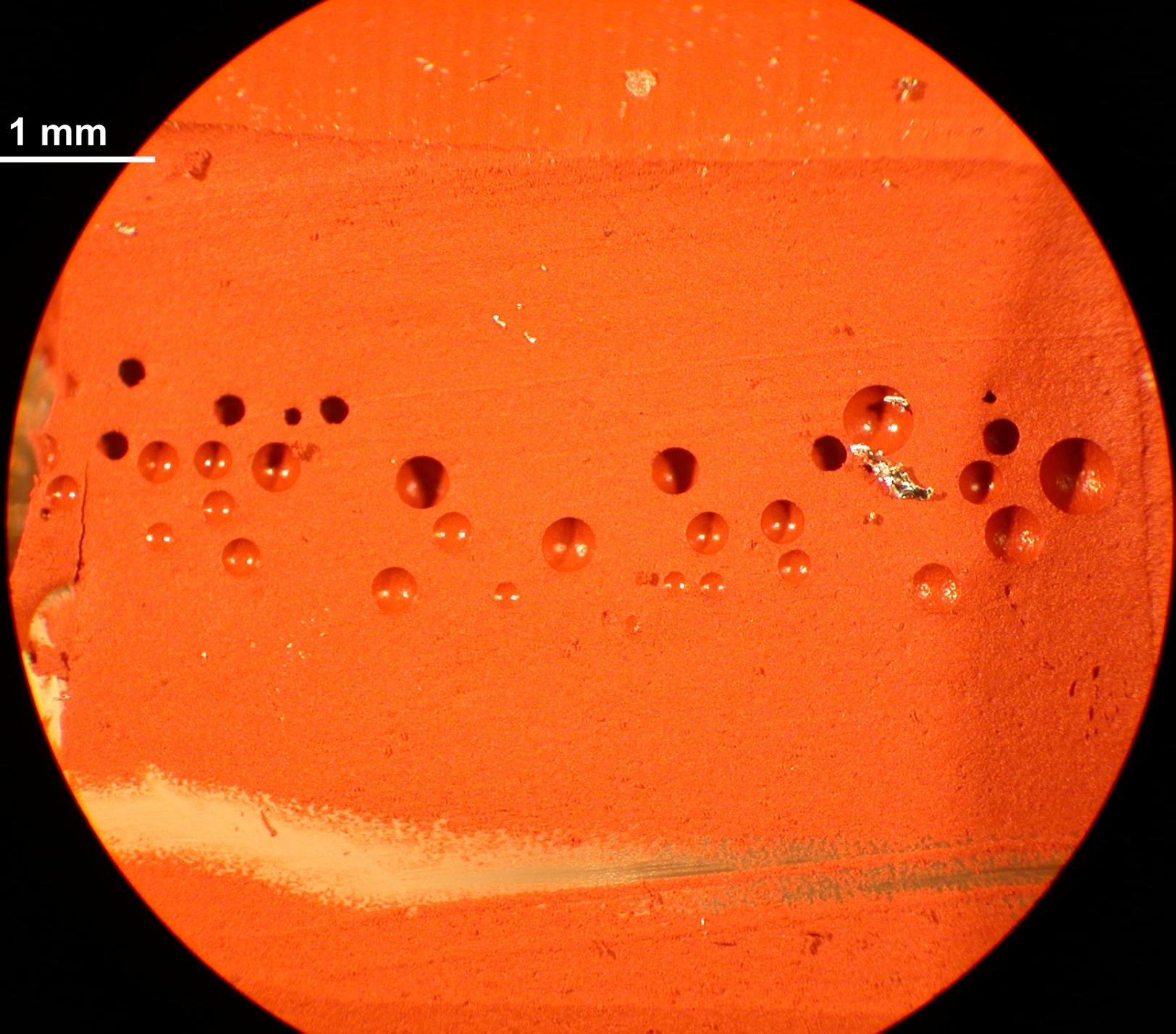
# Disassembly of Failed PMTs

Charles He, Walt Thomas

- Two are being worked on
- Identified fracture source for one (AA0393 NG PMT, by Walt Thomas)
- Small amount of bubbles in RTV, most < 1 mm.
- RTV bonds better to glass than to aluminum housing, varies from assembly to assembly



1 mm



Fracture origination area



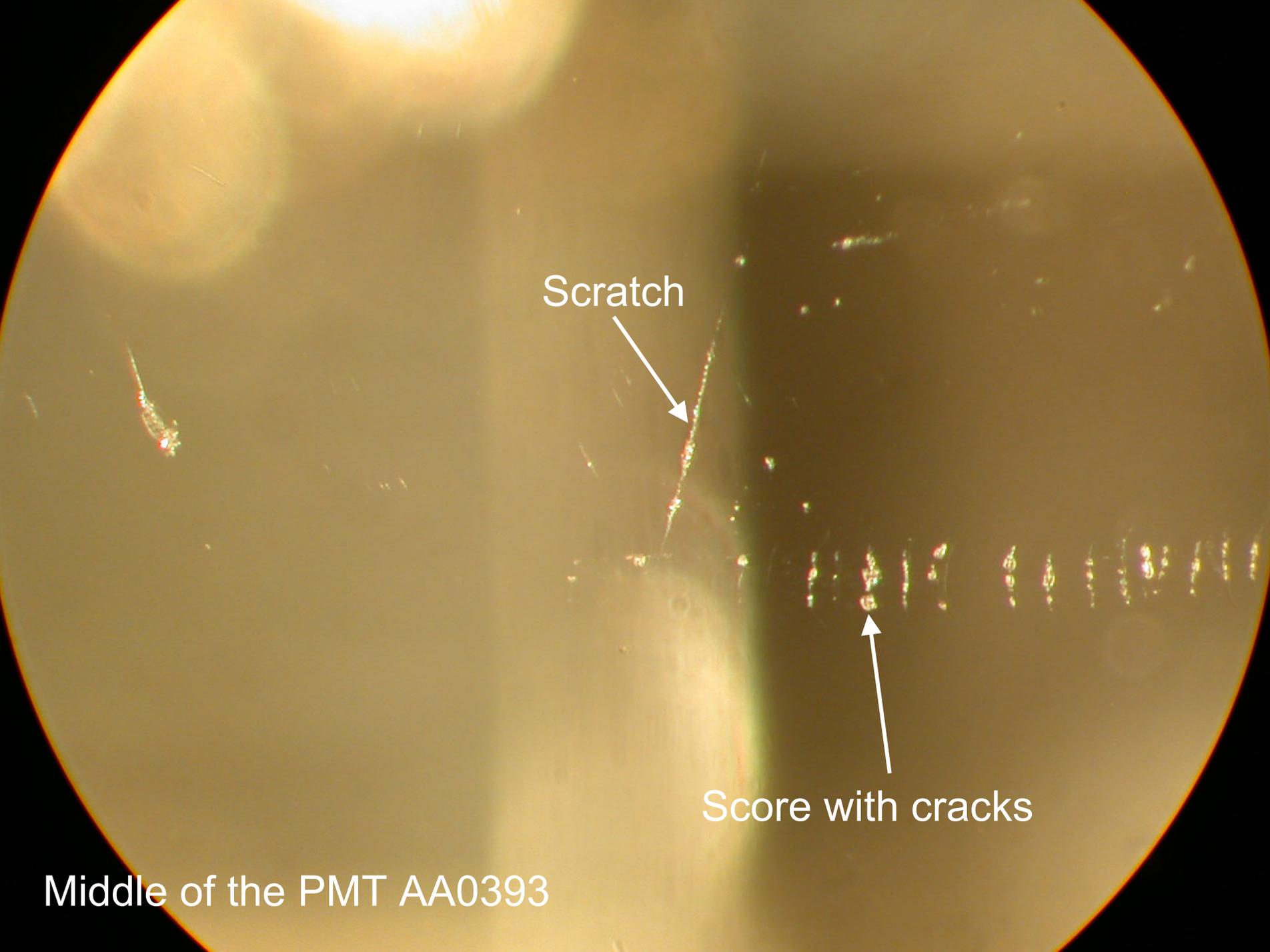
AA0393

15 9:13AM



Score with cracks

Middle of the PMT AA0393



Scratch



Score with cracks



Middle of the PMT AA0393

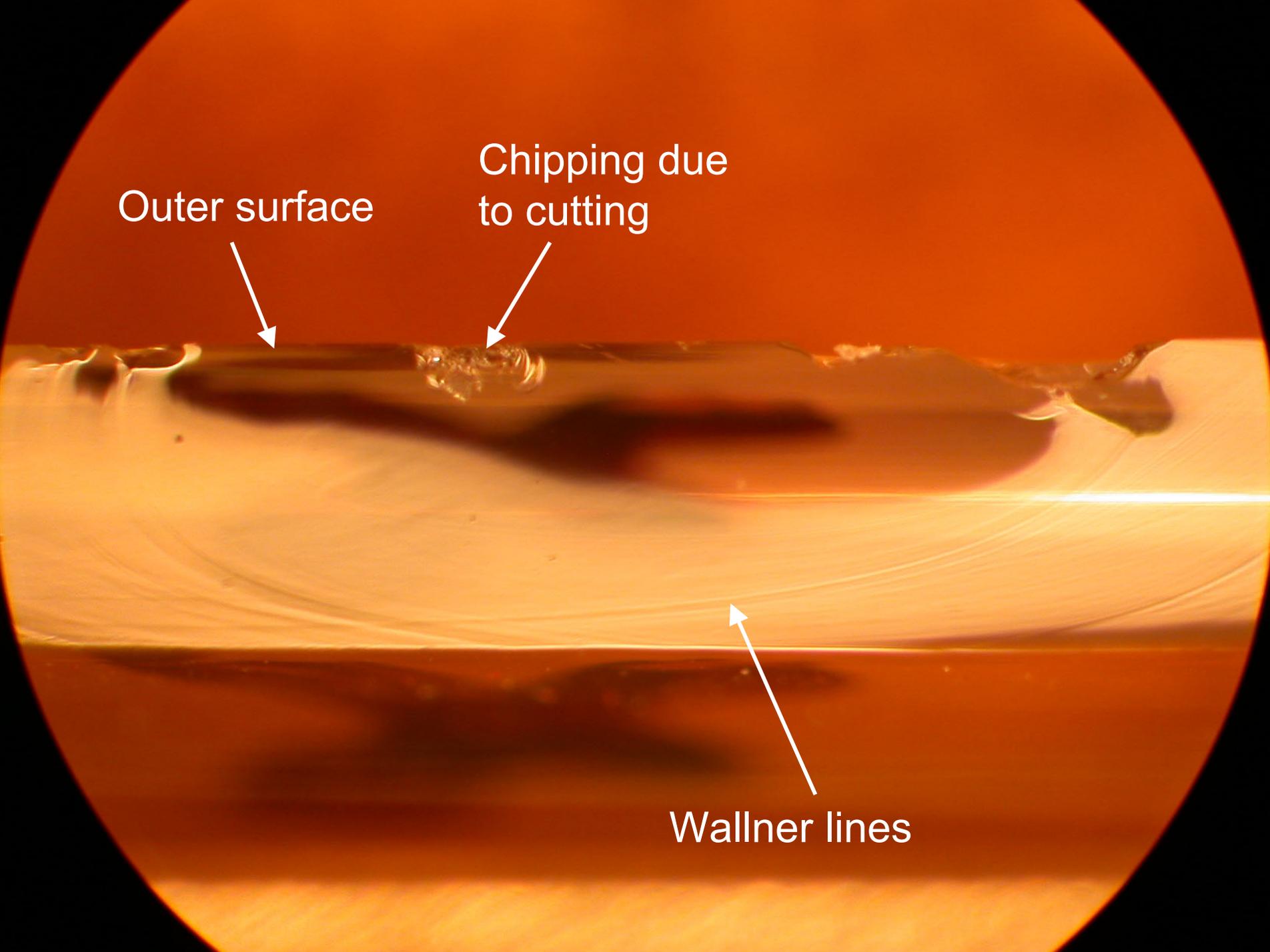
Outer surface

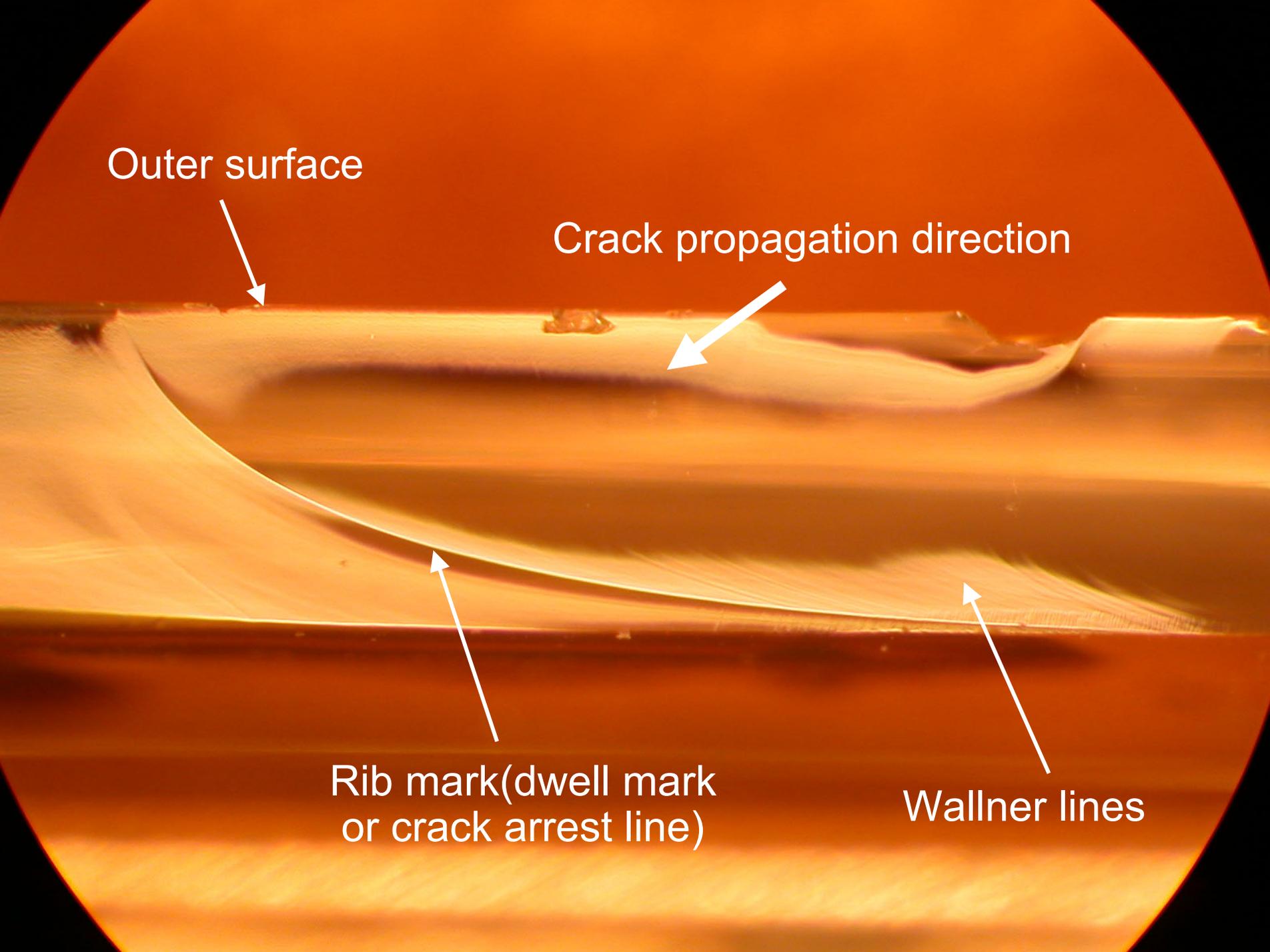


Chipping due to cutting



Wallner lines





Outer surface



Crack propagation direction



Rib mark (dwell mark  
or crack arrest line)



Wallner lines



Outer surface



Crack propagation direction



Wallner lines



Rib mark (dwell mark  
or crack arrest line)



# Fracture Origin of AA0393

Walt Thomas

- Originated from outer surface, about 20 mm from the base
- Inspection before potting: scores with hairline cracks, chippings in the base 1/3 and middle 1/3 regions, rated “Worst”.

# Poisson's Ratio Measurement

Len Wang and Charles He

- Dr. Len Wang designed a new technique and fixture
- Measure the stiffness in two different modes and the ratio directly proportional to Poisson's ratio
- Results from aluminum and glass samples very promising
- Tested 3 lots of RTV566

# Poisson's Ratio at R.T.

Len Wang and Charles He

Material	Measured	Literature
aluminum	0.33	0.33
Borosilicate glass	0.22	0.21
RTV566, Lot 873	0.50	0.46*
RTV566, Lot 931	0.50	0.46*
RTV566, Lot 4031512	0.49	0.46*

\* Value used in previous FEM analysis for the PMTs (from JPL Solar Array Design Handbook)