

**IOO (General)**

shinji.miyoki - 18:57 Tuesday 24 March 2020 (13794)

**Half Wave Plate was damaged and smoke in the REFL table.**

[miyoki, kokeyama, uchiyama]

Nakano-kun found again a strong scattering in REFL camera. So we checked in the REFL table. We doubted the clipping at the HWP again because the beam size at the present HWP almost fits the size of the HWP aperture.

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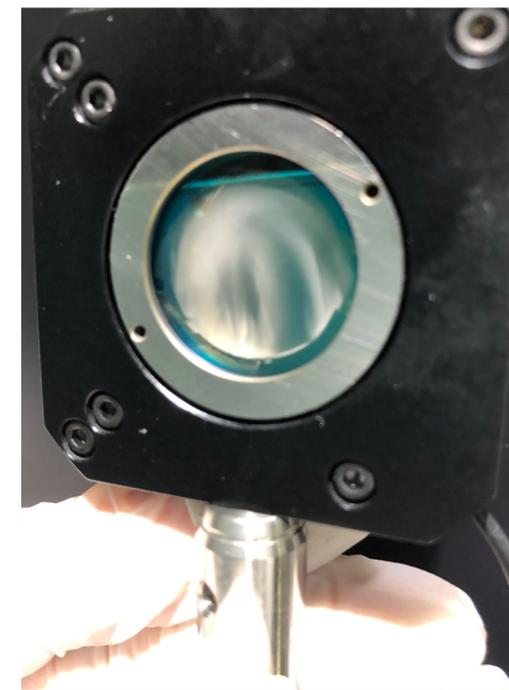
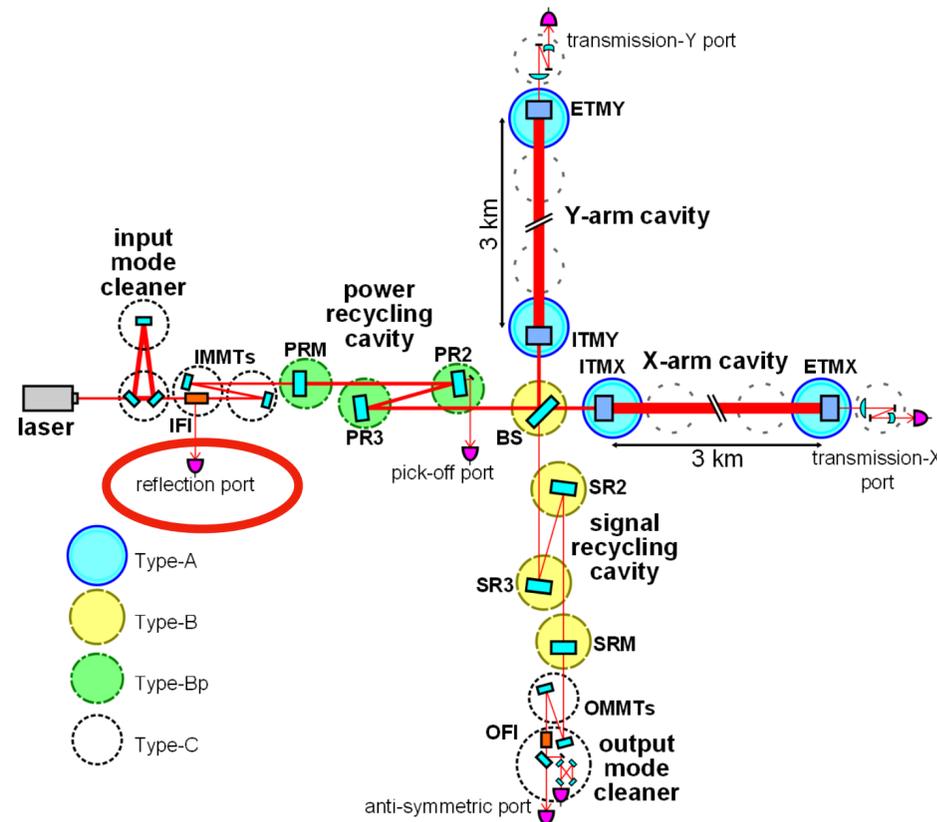
1) We found that a fixing ring for a half wave plate just after the periscope was "burnt" and melted as the first attached image0-1. Especially, the slight transparent area shape is same shape on the REFL camera in the control room. This ring is made of plastic. We guessed this burning occurred by strong IR power. We replaced this HWP and the rotating optical part with new one.

In addition to this, we found a strong scattering on the surface of a beam splitter just after the HWP and PBS plate set. There seemed to be several point scattering sources on the surface by using IR viewer. We wiped it by acetone and ethanol. Point like scattering source vanished, however, we still saw smoky image where the IR hit. So we changed this BS itself with a new one. However, we saw the same smoky image. We concluded that this is due to quality of this BS. However, we never see such smoky image on for example lens. So we should select better BS in the future.

In the same manner, the two mirrors had the possibility to be smoked by smoke from HWP. So we also wiped their surface by using acetone and ethanol. We just believed they are cleaned now. Also we found a smoky coating on the optical table surface around the HWP. When I wiped them by ethanol, they were removed. So, this is also because of HWP burning. According to my memory, this smoky coating on the surface did exist in 2019. I and Miyakawa-kun discussed the possibility about this burning started from the high power injection test in FPMI configuration in 2019.

I forgot to check the surface of PBS plate near the HWP. Sorry, we should check its surface condition again.

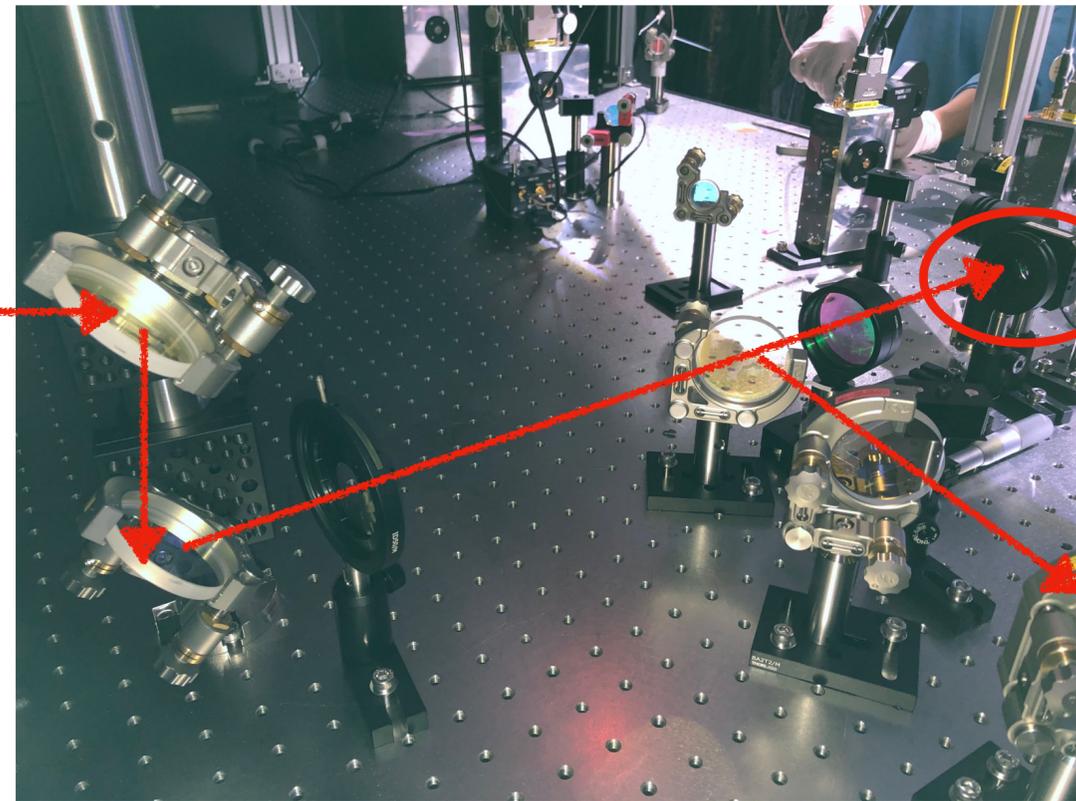
Kokeyama-san, took the relation btw laser power and counts in the digital system in the PDA1.



- **Date; 2020 March 24**
- **What happened;**
  - **Strong scattering in the Refl optical table was observed.**
  - **We inspected the Refl optical table and we found that a fixing ring for a half-wave plate was burnt.**
- **Reason;**
  - **High power (~5W) IR laser hit the fixing ring made of plastic.**
- **Response;**
  - **We replaced HWP and inserted an iris in front of HWP to protect from the laser. Finally, the ring was changed to a metal ring.**

IFI Vacuum chamber

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from REFL viewport  
to periscope  
70 cm

