

# Joint Requirements

ASML, Canon, Nikon

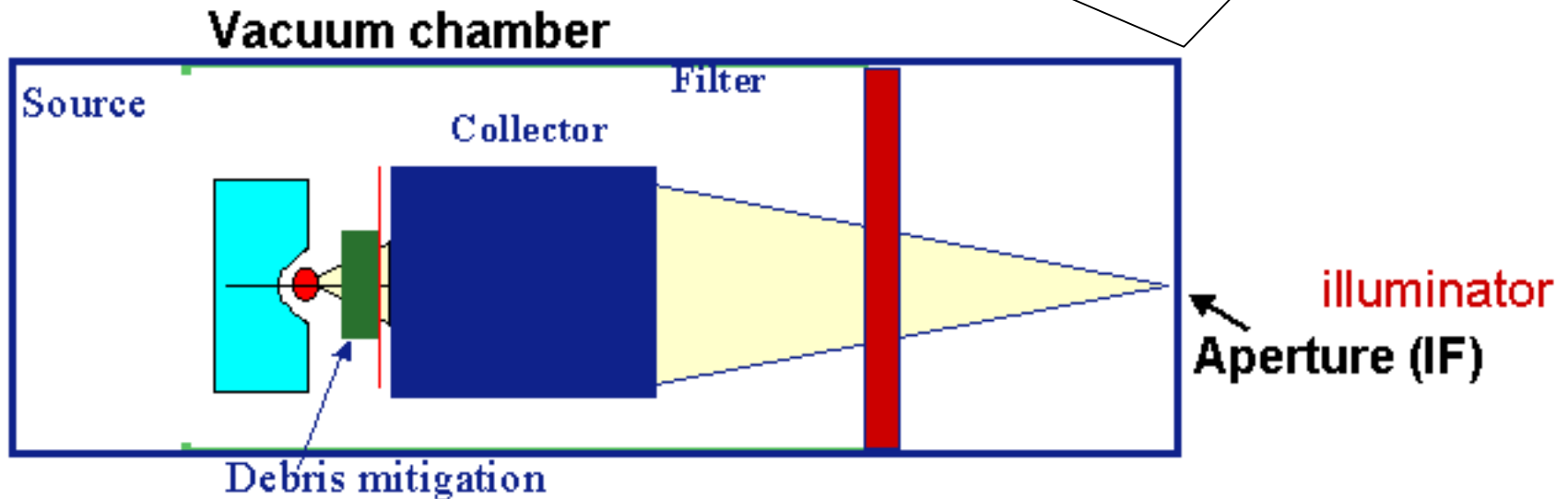


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# Definition of clean photon spot at intermediate focus (IF)

Source specifications are defined at intermediate focus (IF) which is illuminator entrance



# Joint Requirements for EUV Source

<u>SOURCE CHARACTERISTIC</u>	<u>REQUIREMENT</u>
•Wavelength	13.5 [nm]
•EUV Power (in-band)	115 [W] *
•Repetition Frequency	> 7-10 kHz ***
•Integrated Energy Stability	±0.3%, 3σ over 50 pulses
•Source Cleanliness	≥ 30,000 hours **
•Etendue of Source Output	max 1 - 3.3 mm <sup>2</sup> sr ***
•Max. solid angle input to illuminator	0.03 - 0.2 [sr] ***
•Spectral Purity: 130-400 [nm] (DUV/UV) ≥ 400 [nm] (IRVis) at Wafer	≤ 3 - 7% *** TBD ***

\* At IF

\*\* After IF

\*\*\* Design dependent

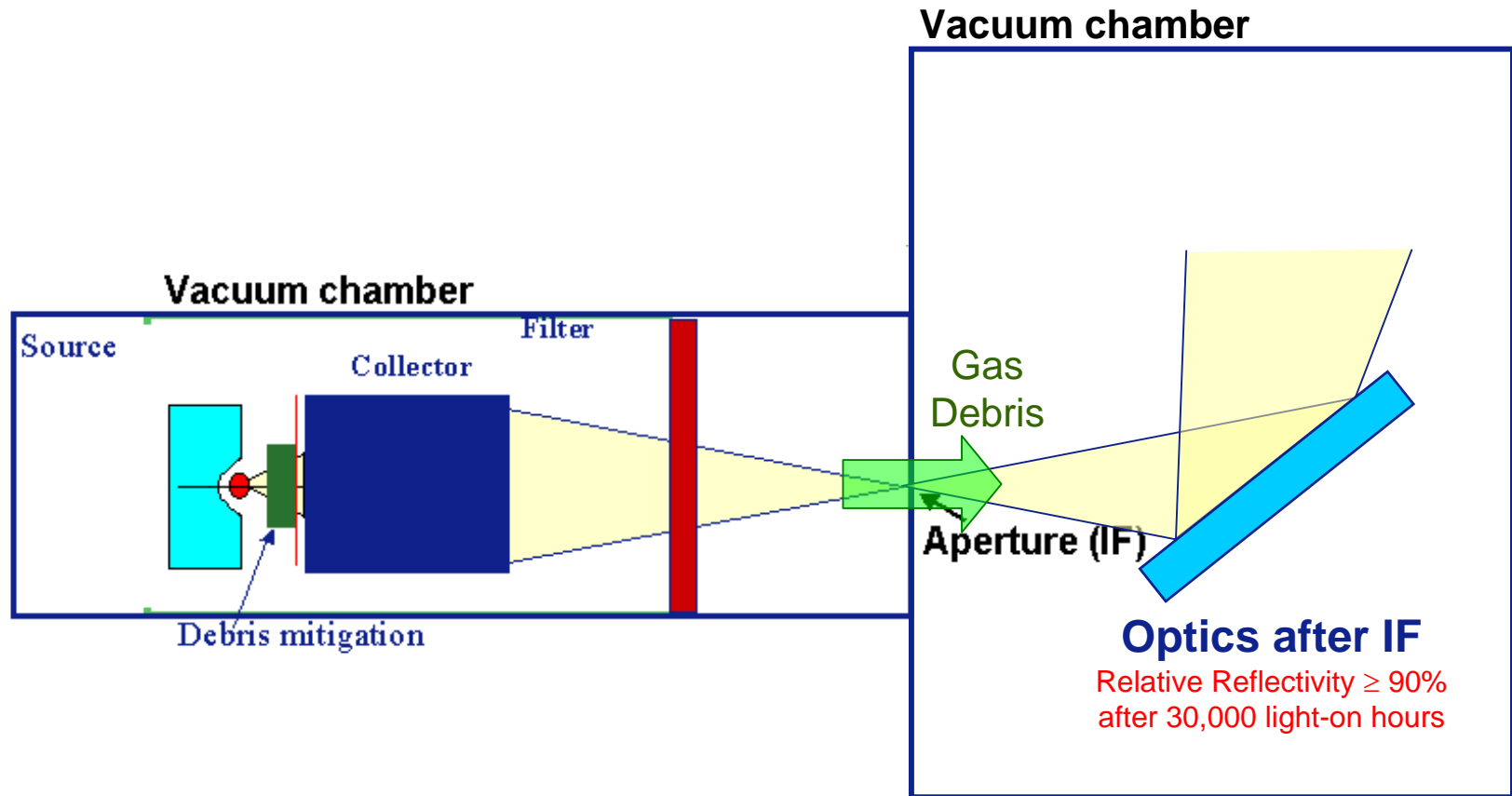
Y. Watanabe Canon,  
K. Ota, Nikon,  
H. Franken ASML



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# Source cleanliness



# Source component degradation

Source cleanliness doesn't require any lifetime of source components, i.e., components before IF.

The lifetime of source components is determined not only by source power but also by all requirements, e.g. etendue, stability and so on.

The exchange time and cost of electrode, collector, debris mitigation and spectral purity filter should be contained in the total maintenance time and cost.

The MTBF, MTTR and scheduled down time for routine maintenance and the maintenance cost for the EUV source should be about the same as or an extension of those of present lithography sources.

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# Component degradation calculation

- Collector end of life transmission : 90%
- Electrode end of life transmission: 90%
- ML end of life transmission: 85%
- Filter end of life transmission: 95%
- **System end of life transmission: 65%**

remarks:

-End of life means: replace or clean component.

-Anticipated required margin (TBD): 90%



# Necessity of proposal from EUV source suppliers

How to measure source component lifetime

CoO which contains:

- Lifetime and cost of spares
- Down time to replace and requalify
- Cost to operate
- Amount of service time
- MTBF
- MTTR



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# Summary

- Joint requirements have been stable since last workshop.
- It is confirmed that source cleanliness is defined as a lifetime of optics after IF and is related to gas and debris flow through an aperture at IF.
- The MTBF, MTTR, scheduled down time for routine maintenance and the maintenance cost for the EUV source should be about the same as or an extension of those of present lithography sources.
- We need proposals about measurement method of source component lifetime and CoO of EUV source from source suppliers.



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