

Status of DF and WLS for the VD-Module-0

C. Cattadori
02/12/2022

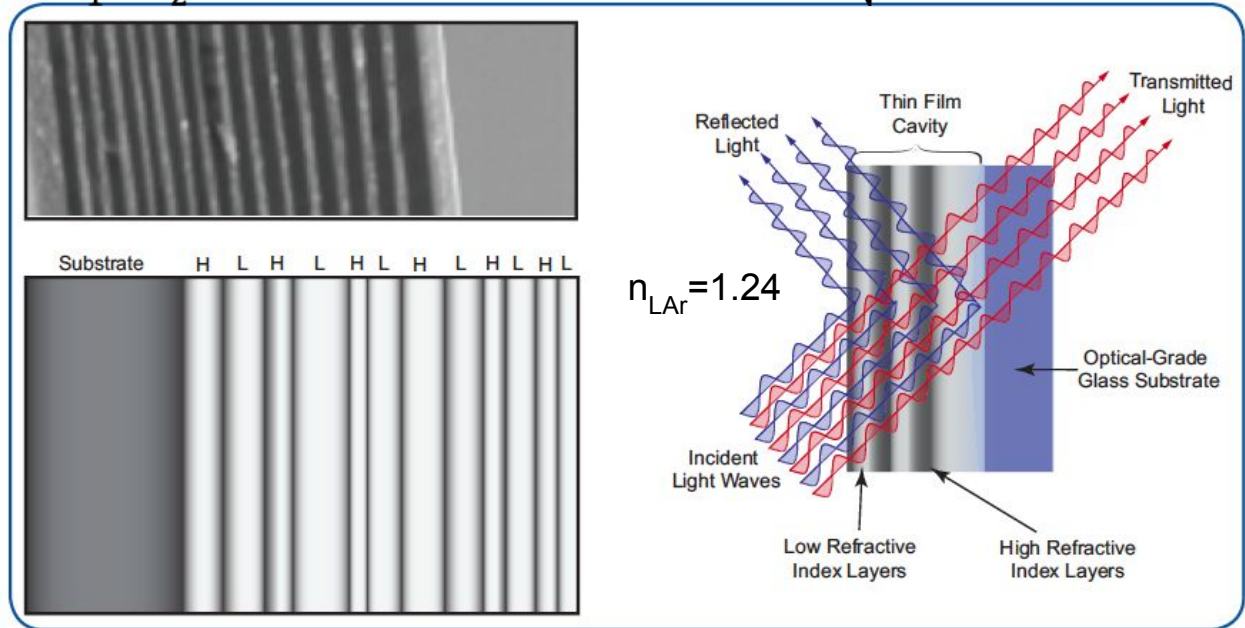
The structure of a Dichroics filter based on MultiLayer structures

- **Reflectivity:** $\rho^2 = \left| \frac{n_1 - n_2}{n_1 + n_2} \right|^2$

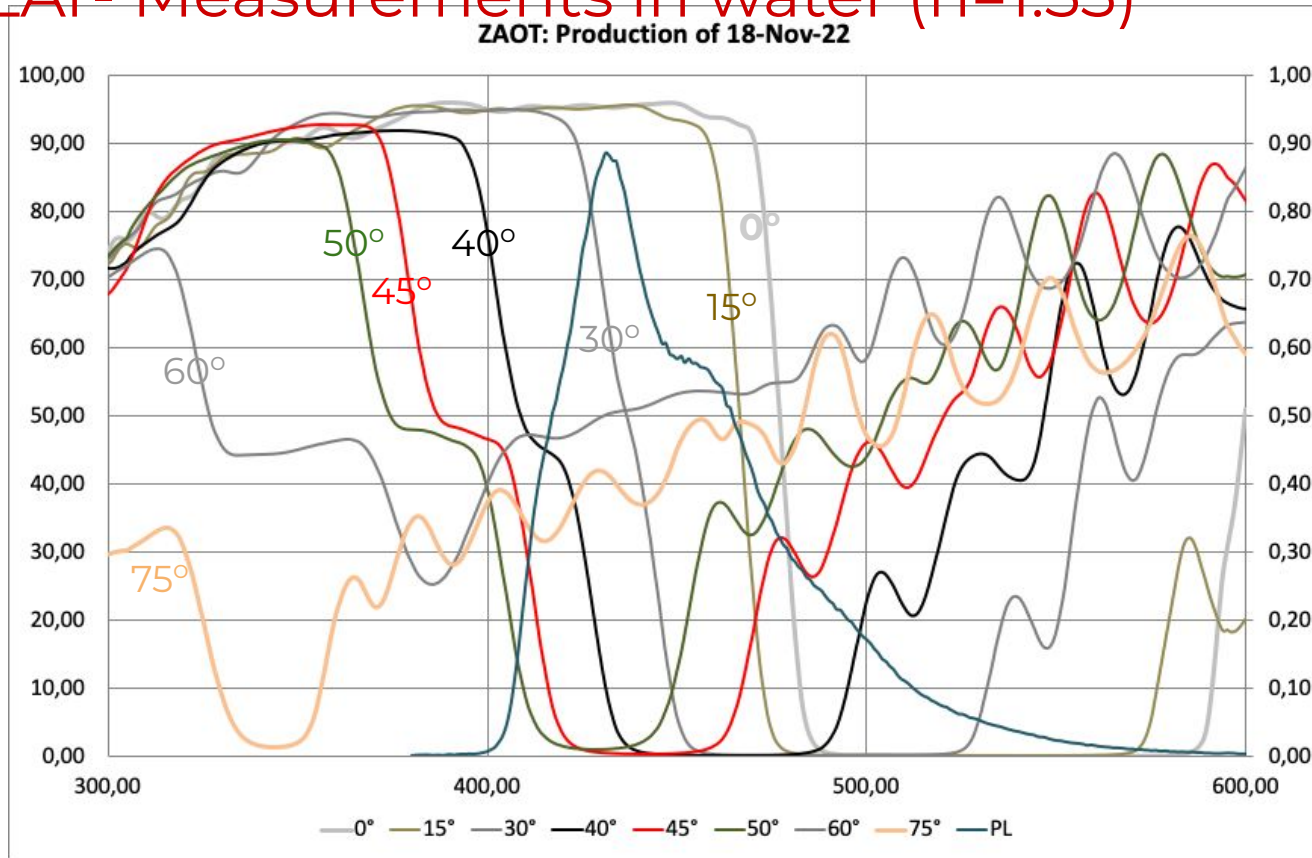
- *Cutoff dependency from refraction index*

Dichroic ML operate as a Fabry-Perot interferometer

$$\lambda = \lambda_0 \sqrt{1 - \frac{n_1^2}{n_2^2} \sin^2 \theta}$$



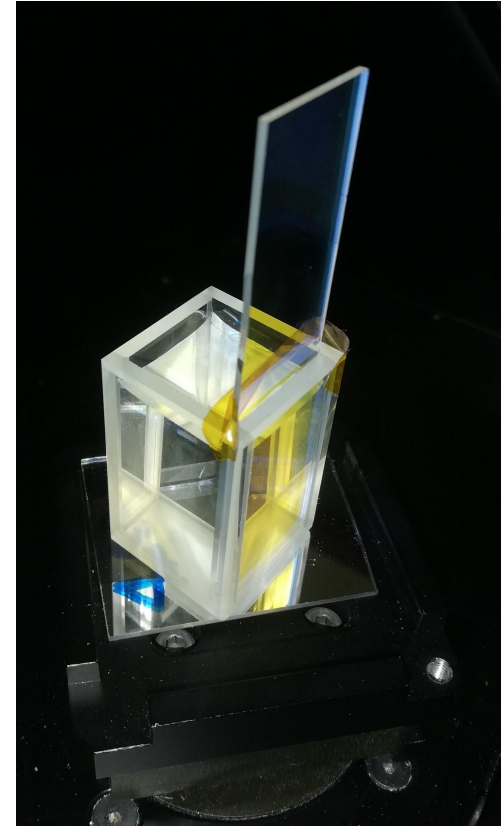
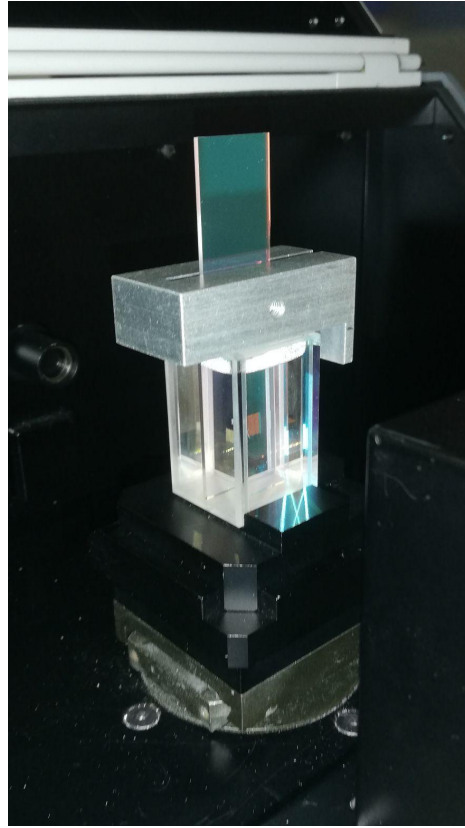
Production 18-Nov-2022 - Designed for operation in LAr- Measurements in water (n=1.33)



- Designed for AOI= 45° in LAr
- Good “closure” for intermediate AOI: 40°-50°
- Bad closure for AOI>50°
- LAr design → narrower reflectivity dip → the PL spectrum is barely fully contained

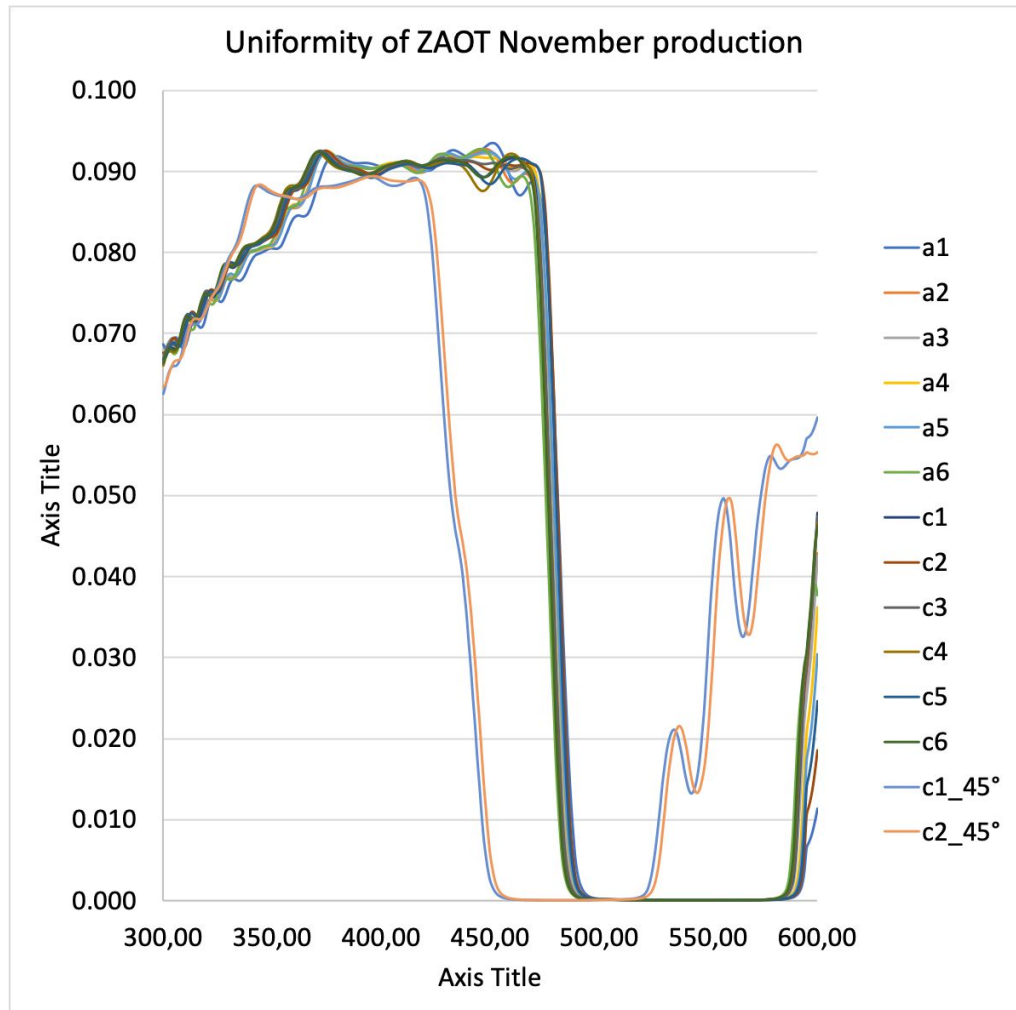
Measurements on ZAOT Dichroics ML coatings

- A slice of dichroic coated glass is located at the center of a 2 cm side vial (optical glass) filled with demi H₂O
- The AOI of the glass w.r.t. the beam is changed by mean of a goniometer
- Measurements performed in a spectrofotometer



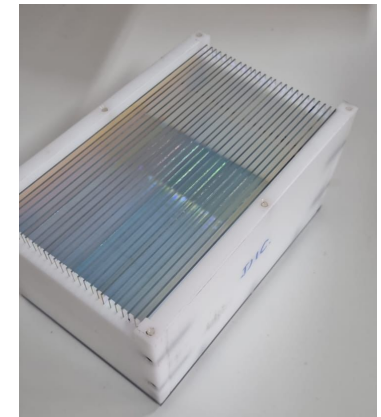
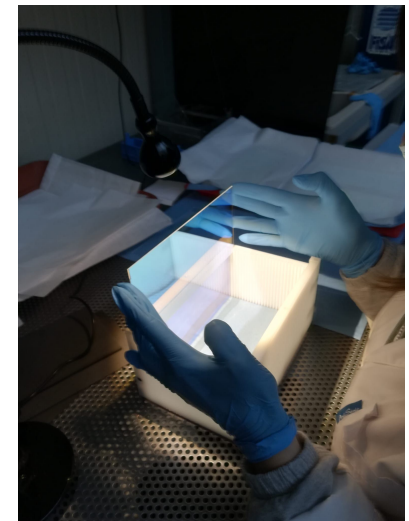
Uniformity of ZAOT DF 202 x 97.5

- two extreme positions (a and c) of the ML coating disk tested
- each of the two DF tested at 6 different points



Dichroic Filters: ZAOT production

- 120 x (202 x 97.5 x 1.1) mm³ glasses with dichroic ML produced and delivered in two batches at Campinas. For technical details <https://indico.fnal.gov/event/57277/contributions/255135/attachments/161903/213816/Report%20from%20ZAOT%20for%20Module-0-1.pdf>
 - 1st batch arrived in Campinas on 30-Nov
 - 2nd batch arrived today
 - a set of 6 x (100 x 77) mm² delivered for PDE meas @MiB
- The T curves measured in H₂O at d7 AOI have been shared in the WG. No feedback received



Next steps

- Production of 110 DF in 143.75 x 143.75 mm size: possibly upgraded design
- Delivery for the middle of Jan'23
- Coating.....Feb'23 (to be checked with Campinas)

WLS

- 6 x (607 x 607 x 4) mm³ ready for shipment at CERN Preveessin
- Flat edges (no divot/dimples): this following the results of accurate study: PDE meas (see C. Brizzolari's talk) performed at INFN-MiB in high purity LAr with ionizing particles

https://indico.fnal.gov/event/57277/contributions/255133/attachments/161904/213817/20221122_MiB_PhCollector.pdf

- Laser cut and edge polished
- Produced (not yet cut): ~12 plates
- Divot design of the next plates: tbd

