

## Cavity-Ring-Down-measuring setup for precise measurement of losses at high-reflective coatings

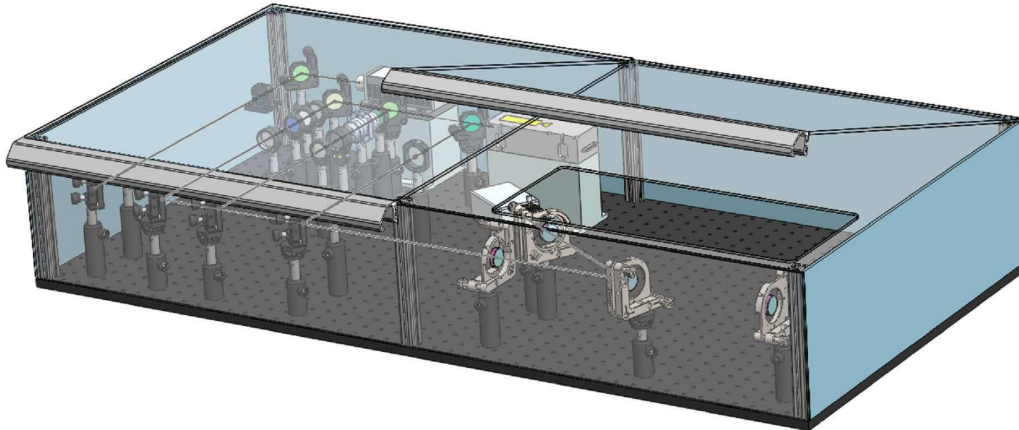


Figure 1: Exemplary conceptual drawing of a four-wavelength measuring setup of the CRD type

### Field of application:

- Precise **evaluation of losses** at high-reflective optical coating layers
- Measurement of losses at plane and slightly concave ( $|r| > 500 \text{ mm}$ ) optical components with nominal reflectivities  $R \gg 99\%$
- At  $R > 99.5\%$ , to a **precision of  $dR/R < 2 \text{ ppm}$** .
- Measurement of losses at **various, discrete angles of incidence**
- Employed **laser wavelength(s) selectable on order by the user**, according to the desired target wavelength of the coatings (e.g.  $\geq 355 \text{ nm} \dots 532 \text{ nm} \dots 633 \text{ nm} \dots 1064 \text{ nm} \dots \leq 1319 \text{ nm}$ )

### Measurement principle:

- Coupling of a pulsed or fast switched cw laser into a passive resonator cavity
- The coating under measurement is hit on every round-trip → **reflective losses**
- Highly precise evaluation of the time dependence of the out-coupled signal → **ring-down**
- With known round-trip time for a pulse, the ring-down temporal characteristic evaluates the losses  $L$  per reflection; with the assumption that  $R = 1 - L$ , the reflectivity is obtained.

### Technical specifications:

Measurement of reflectivities: Precision:	$R \gg 99\%$ $dR/R < 2 \text{ ppm}$ for $R > 99.5\%$
Evaluable samples / requirements on the substrate*: <small>*For measurement under <math>0^\circ</math> a.o.i. Other specifications on request.</small>	$\varnothing 1''$ or $0.5''$ ( $\sim 25, 12.5 \text{ mm}$ ), thickness $\sim 6 \text{ mm}$ ; substrate transparent at employed wavelength; rear side polished, plane
Power supply: laser (may vary according to model): detector:	100 – 240 V AC, 50 Hz ... 60 Hz +/- 9 V DC
Modules for data acquisition, A-to-D-conversion and data procession	
Interface to PC (Windows, not included): USB 2.0	
Software for evaluation (reflectivity analysis) and data base handling of measurement data (e.g. input of production and measurement parameters, sample-no. etc.)	

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