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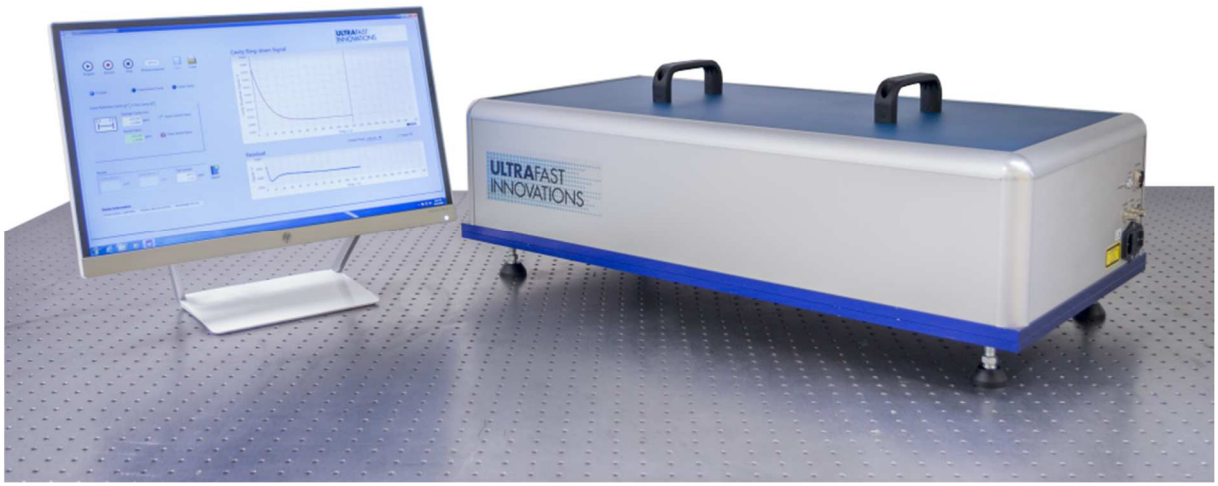
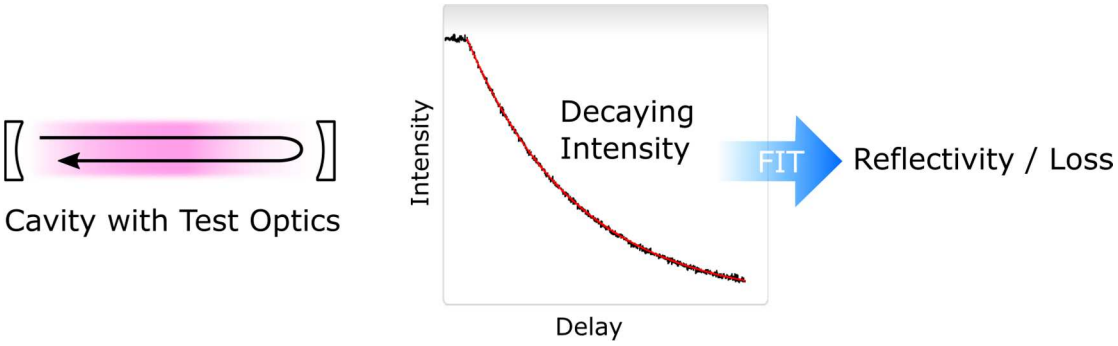
Cavity-Ringdown (CRD) Reflectometer and Loss Meter



Our reflectometer uses the extreme sensitivity of cavity ring-down spectroscopy to quantify the losses of advanced optical coatings down to 5 ppm. As a typical application the device can characterize supra-mirrors with up to 99.9995 % reflectivity.
Cavity ring-down spectroscopy measures optical losses by the decay of the energy stored inside a cavity. The technique reaches unrivalled sensitivity, because losses are experienced with each round trip inside the cavity over and over again. Smaller losses lead to longer intra-cavity dwell time thereby automatically increasing measurement precision.
The device features high-speed data acquisition and allows to record measurements within seconds. It is delivered complete with a computer and a user-friendly software interface for acquisition and real-time analysis.

Key Product Features:

- **Reflectivity Measurements**
  Reflectivities up to 99.9995%
  Various angles of incidence (0-45°)
  s and p polarization
- **Antireflective Coating Characterization**
  down to 0.0005% (5 ppm)
- **Simple and reproducible alignment**
- **Spring-loaded mirror fixtures** for reproducible mounting without strain
- **Computer and user-friendly software interface included**
- **High-speed data acquisition and real-time analysis**
  Complete measurement and analysis within seconds
- **Available wavelengths**
  375-1550 nm
- **Footprint**
  85 x 45 cm^2



Principle of reflectivity/loss measurement with cavity ring-down spectroscopy

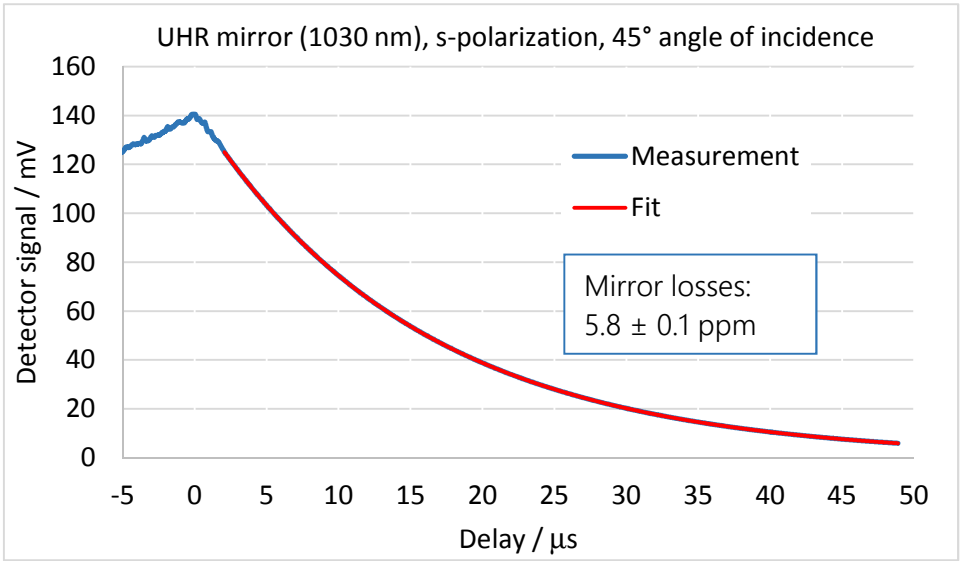
Pulses travelling inside a cavity (left) experience optical losses over and over again during each round trip. The device measures the time-dependent intensity $I(t)$ leaked through an end mirror of the cavity (center). The signal decays with a time constant depending on the intra-cavity losses and can be fit to an exponential function of the form:

$$I(t) = I(t_0) \times \exp\left(-\frac{t}{\tau}\right).$$

The time constant τ is inversely proportional to the optical losses (1-R) of the cavity with total reflectivity R:

$$\tau = n/c\frac{l}{(1-R)},$$

where n is the refractive index, c is the speed of light, and l is the cavity length.



Sample measurement

The figure above shows a typical loss measurement of an ultrahigh-reflective mirror for 1030 nm. The losses of the test mirror were obtained by subtracting the results of a reference measurement with an empty cavity.