

Transfer Cavity

Single-axis Transfer Cavity

The AOS-Cav- λ_R - λ_1 is a single-axis, non-confocal Fabry-Perot optical cavity in UHV for stabilization transfer from a reference laser with wavelength λ_R (e.g., rubidium-stabilized 780 nm laser) to disparate laser wavelengths (e.g., for atomic ion laser cooling). This can be accomplished by the Pound-Drever-Hall (PDH) technique or scanning transfer techniques. The factory target finesse is $> 1,000$ for each of the wavelengths. The transfer cavity includes an electrical interface for the PZTs, thermistors, and heating elements for temperature stabilization. A 3 L/s ion pump, with positive polarity, is attached to the chamber to keep the cavity pressure at $\sim 10^{-9}$ Torr (*ion pump controller is not included*). The chamber has a pumping port pinch-off tube and getter activation pins for removing small amounts of gas.



Features

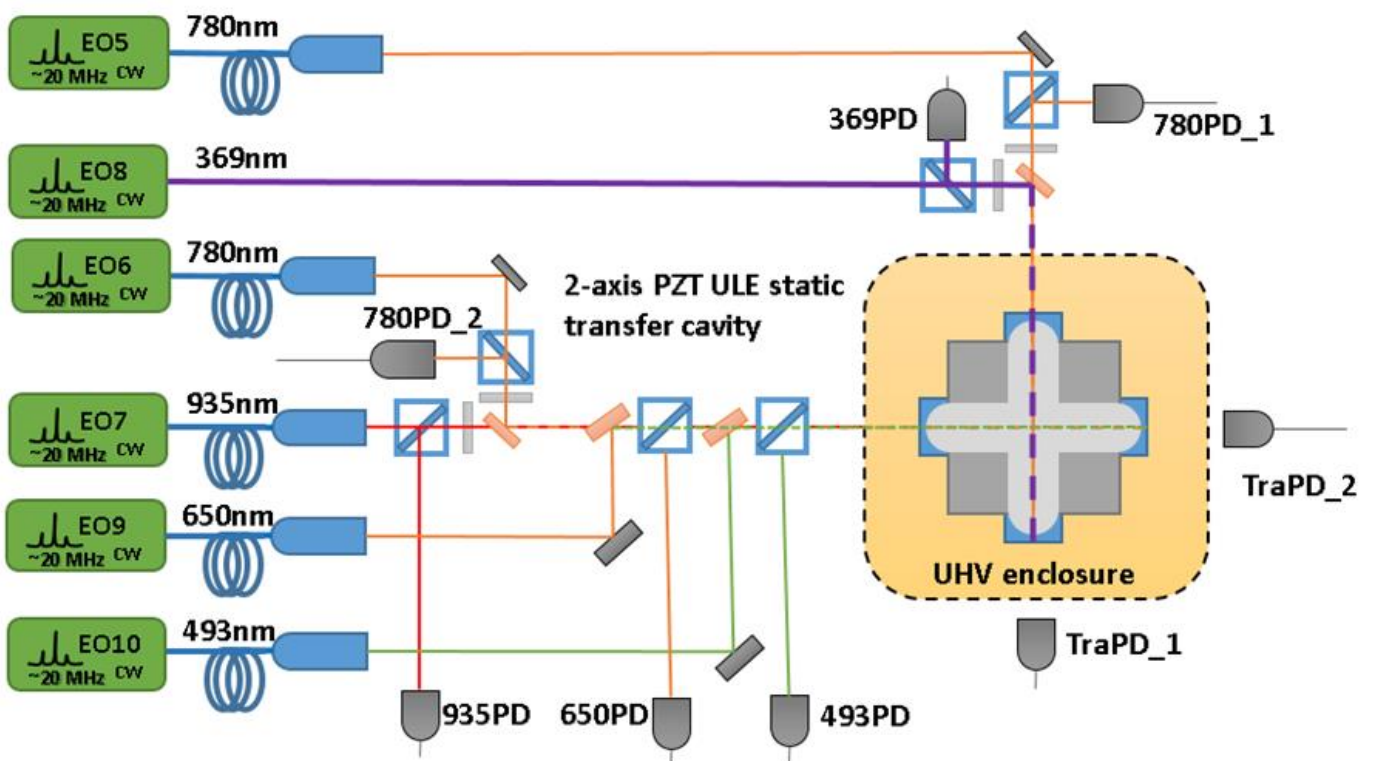
- ⊗ **Thermally & acoustically stable by piezo and temperature tuning.**
- ⊗ **Cavity under UHV and vacuum compatible.**
- ⊗ **Compact and robust design.**
- ⊗ **Mechanical and electrical layouts for customizability**

Specifications

Device Information	
Model No. (example)	AOS-Cav-780-369
Serial No.	CAV-SAMPLE
λ_R	780 nm
λ_1	369 nm
Safe Operating Conditions	
Heater power limit	<5 W
Heater resistance	<2 Ω
Maximum operational temperature	45 °C
PZT voltage min/max	-20 V/+100 V
Ion pump polarity	Positive
Ion pump bias voltage	5 kV
Parameters	
Free spectral range (FSR)	~ 5 GHz
Design finesse	369 nm: 1,000 - 3,000 780 nm: 3,000 - 5,000
Mirror curvature	M1: ROC 20 cm M2: Plano
Waist at M2	369 nm: 184 μ m 780 nm: 268 μ m
Temperature tuning	~ 0.2 FSR/K (est.)
Piezo tuning	>3 FSR (full range, est.)
Temperature sensing	10 k Ω thermistor, Beta = 3669
Factory Calibration	
Finesse	780 nm: > 5,000 369 nm: > 1,000
Piezo tuning	Axis 1: ~20 V/FSR @ 780 nm
Vacuum pressure	~10 ⁻⁹ Torr

Transfer cavities for laser frequency stabilization

- Laser stabilization at frequencies without convenient atomic resonances (e.g., ions)
- Multi-axis simultaneously references Doppler & repump for two species
- **Example: Two-axis transfer cavity for locking Ba^+ / Yb^+ lasers**
 - Axis 1: 370 nm / 780 nm
 - Axis 2: 493 nm / 650 nm / 935 nm / 780 nm



For more information, contact us at sales@aosense.com

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