

# MODIFIED ACTIVE DISTURBANCE REJECTION CONTROL FOR MICROPHONICS REDUCTION IN SRF CAVITIES

24.06.2025

13th MT ARD ST3 meeting

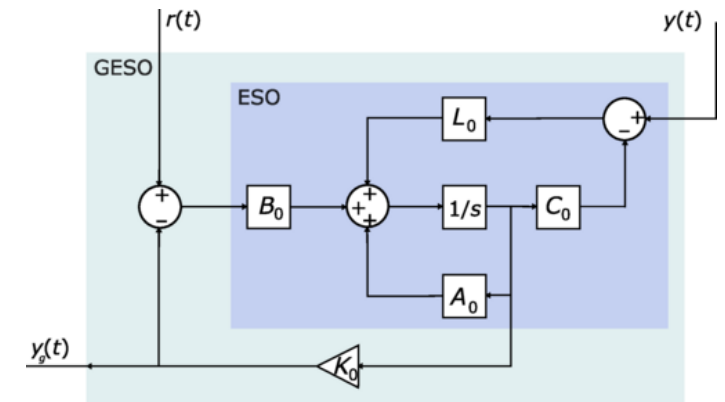
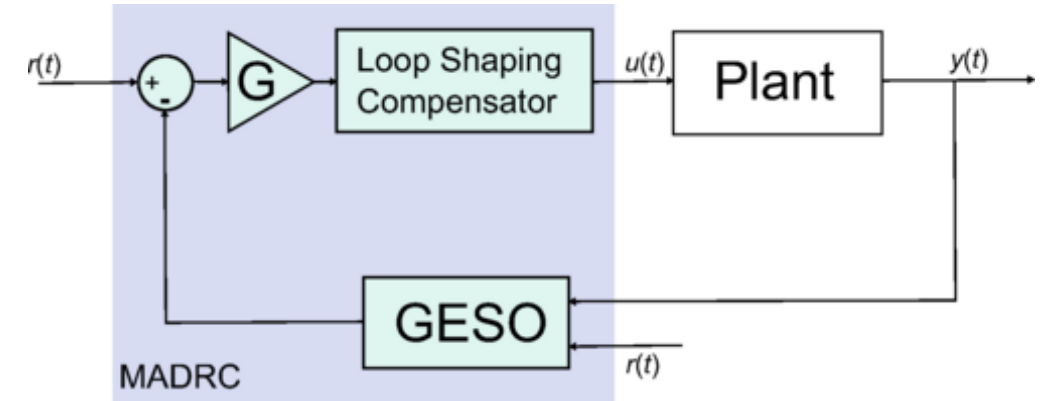
Pablo Echevarria et al.



# Modified Active Disturbance Rejection Control

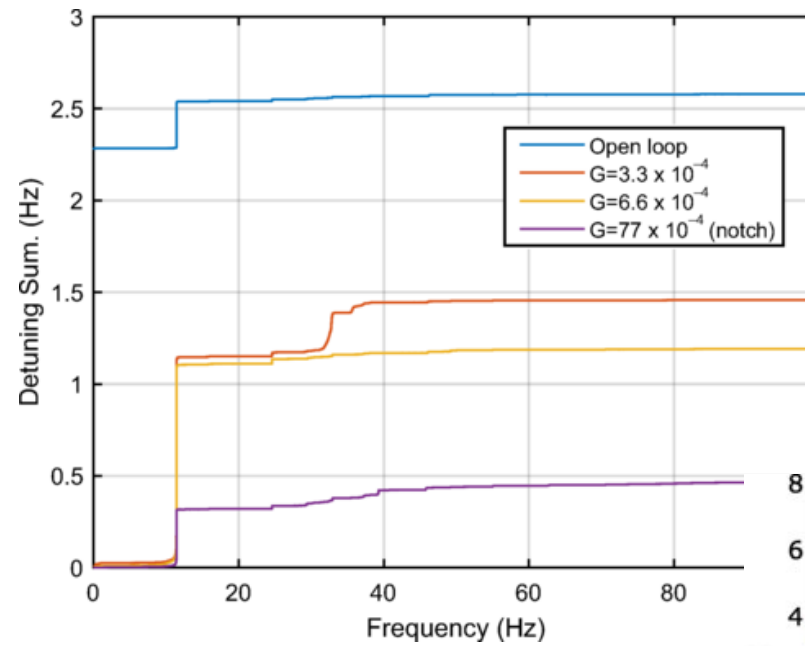
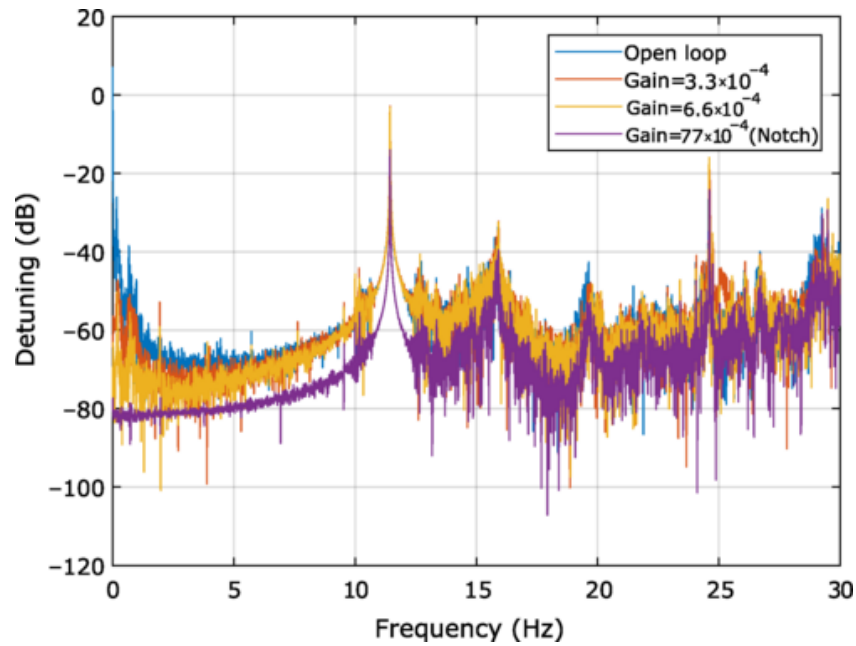
## Detuning feedback in SRF cavities with high QL

- **Feed-forward**  $\rightarrow$  vibrations whose **frequency is fixed and localized**.
- **Low-frequency stochastic disturbances**  $\rightarrow$  **feedback** is necessary.
- **Mechanical eigenmodes** make PIDs instable even with low gains
- **Active Disturbance Rejection Control (ADRC)** as an alternative to PIDs



In the „classical“ ADRC time delay is a show stopper

# Results with a TESLA cavity @ HoBiCaT (HZB)



Frequency and integrated frequency response  
(with an external excitation @ 11Hz)

Time domain response  
(without external excitation)

