# Experimental validation for low-frequency isolation of six degrees of freedom systems using optical inertial sensors

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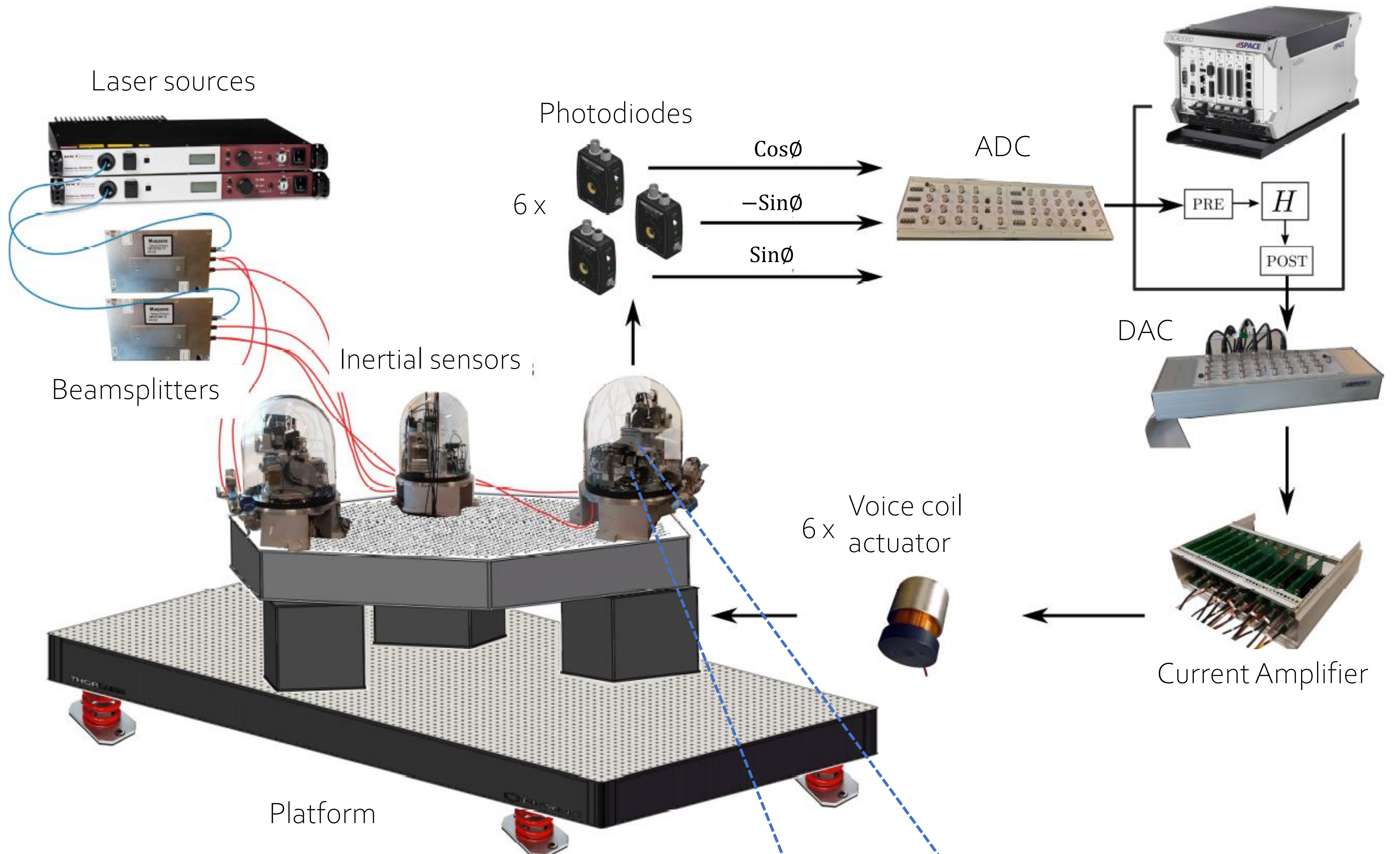
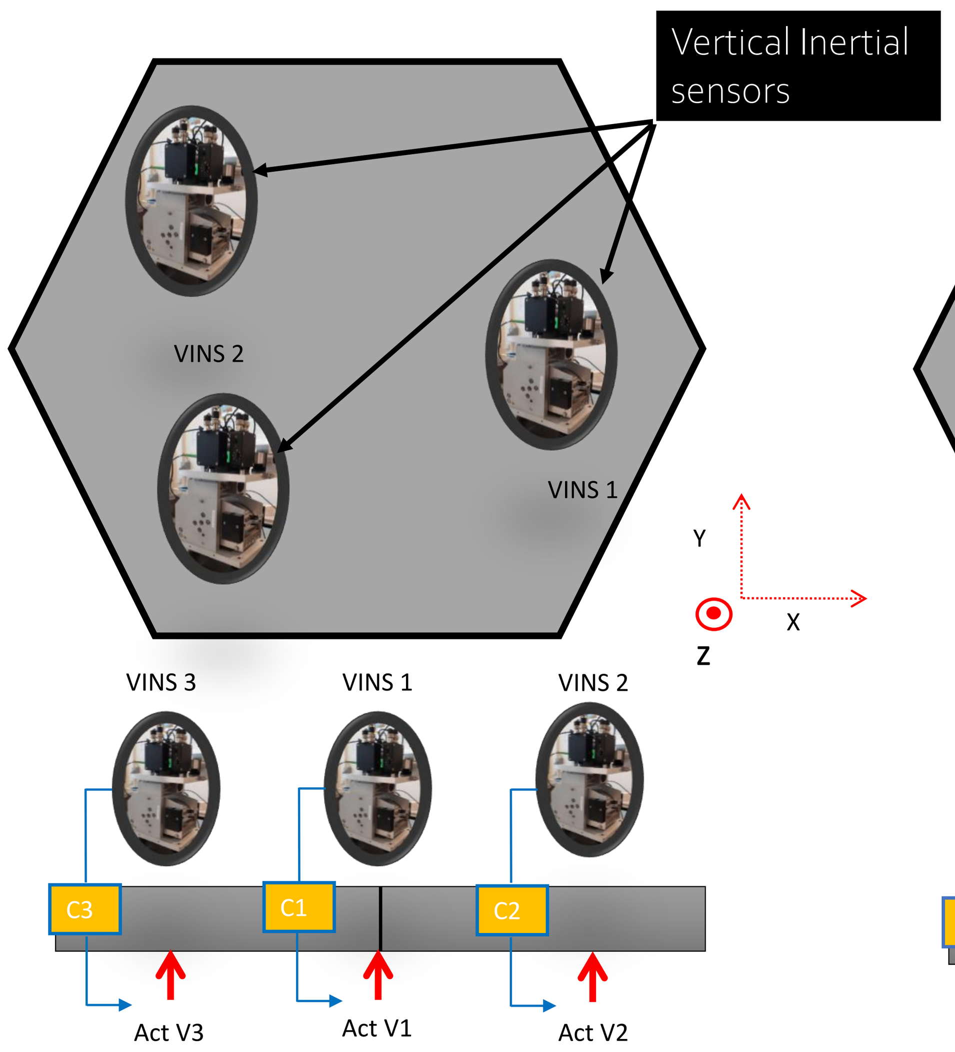
## Abstract

Gravitational wave detectors are required to operate in an ultra-stable environment that can be obtained only by isolating them from external disturbances. Moreover, active isolation is a major approach in this context and it was successfully implemented in LIGO's positioning platform [1][2]. This study addresses theoretical approaches and corresponding experimental validations for low-frequency active damping and isolation of a six degrees of freedom platform between 0,1 Hz and 10 Hz [3].

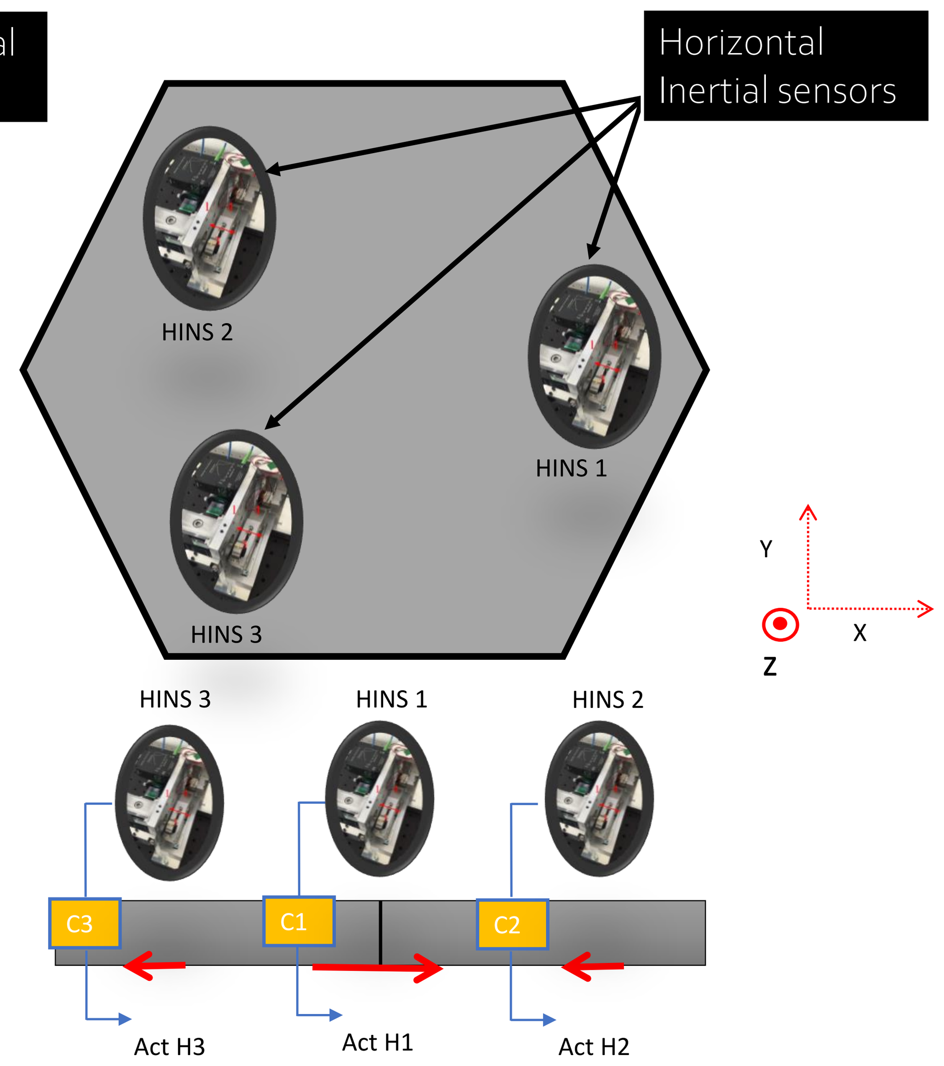



Six degrees of freedom setup

## Decentralized control

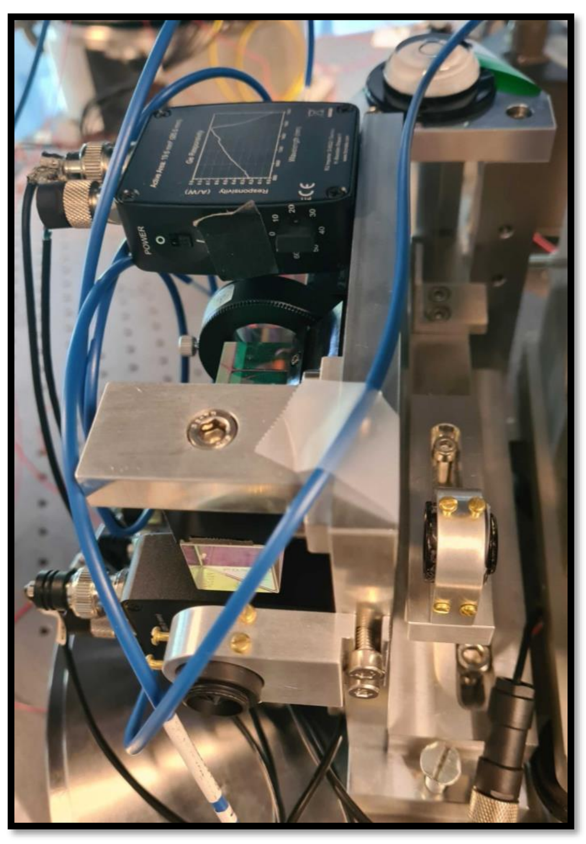



Vertical loops closed in a decentralized way



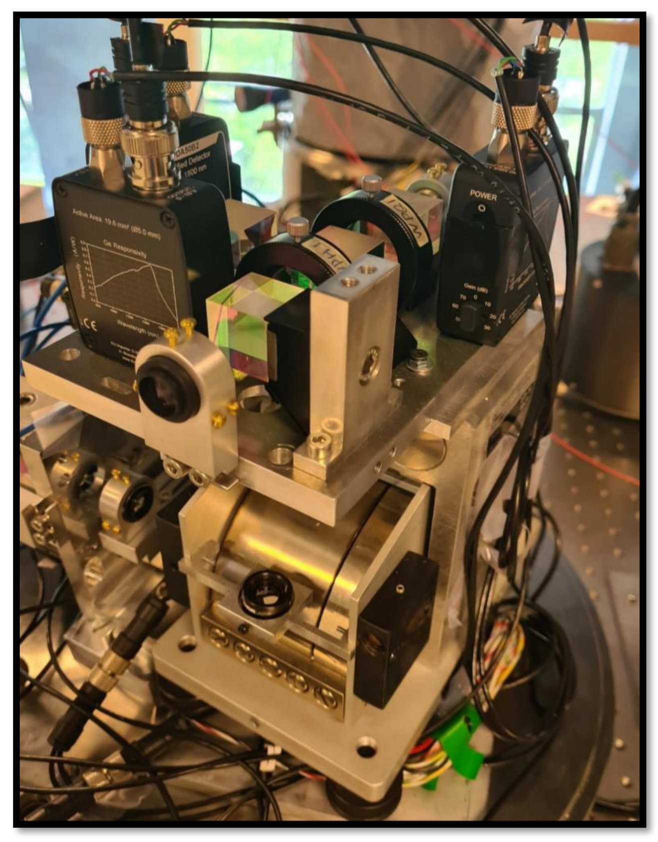

Horizontal loops closed in a decentralized way

## Horizontal sensors



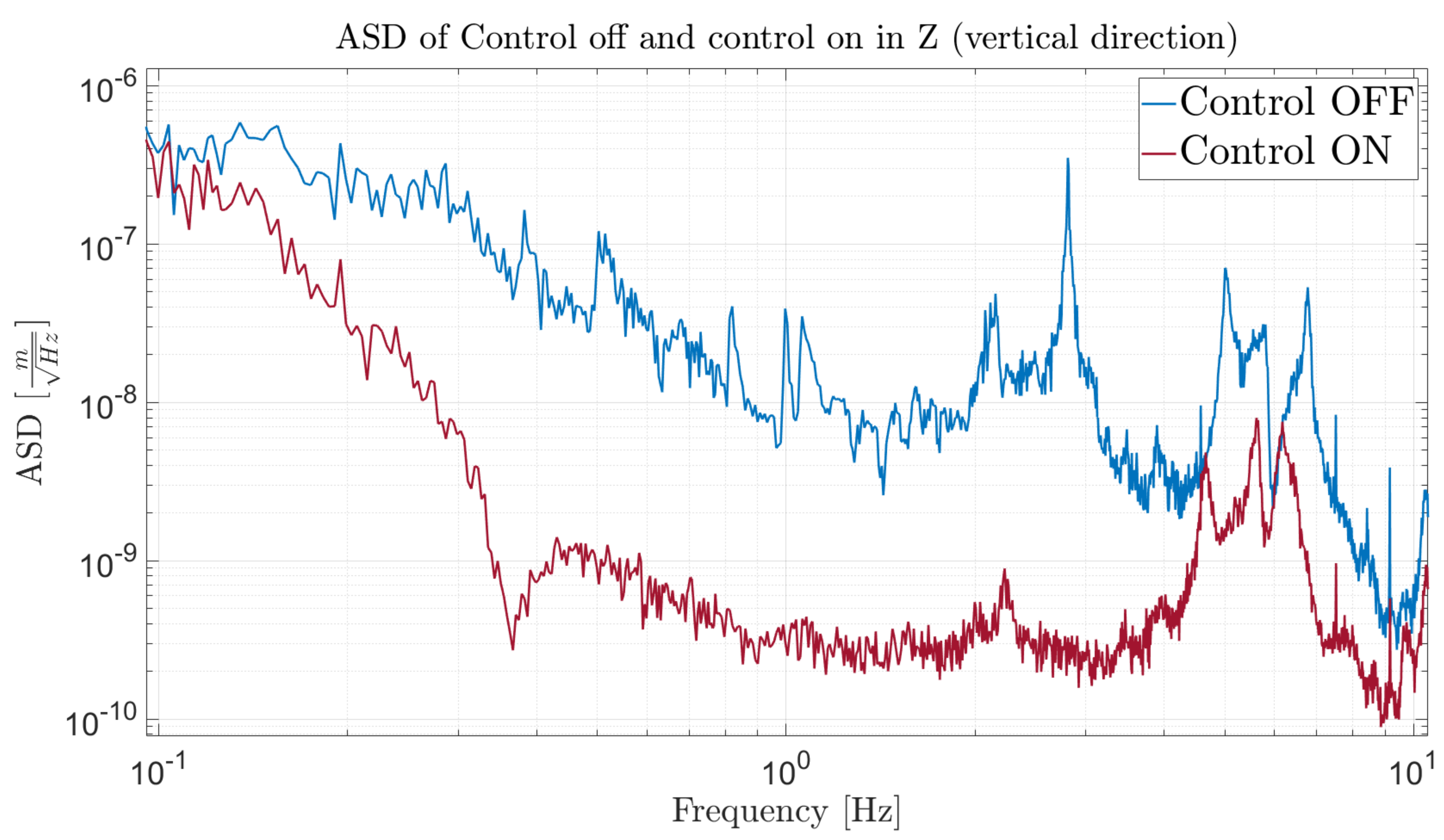
Horizontal Inertial sensor [4]

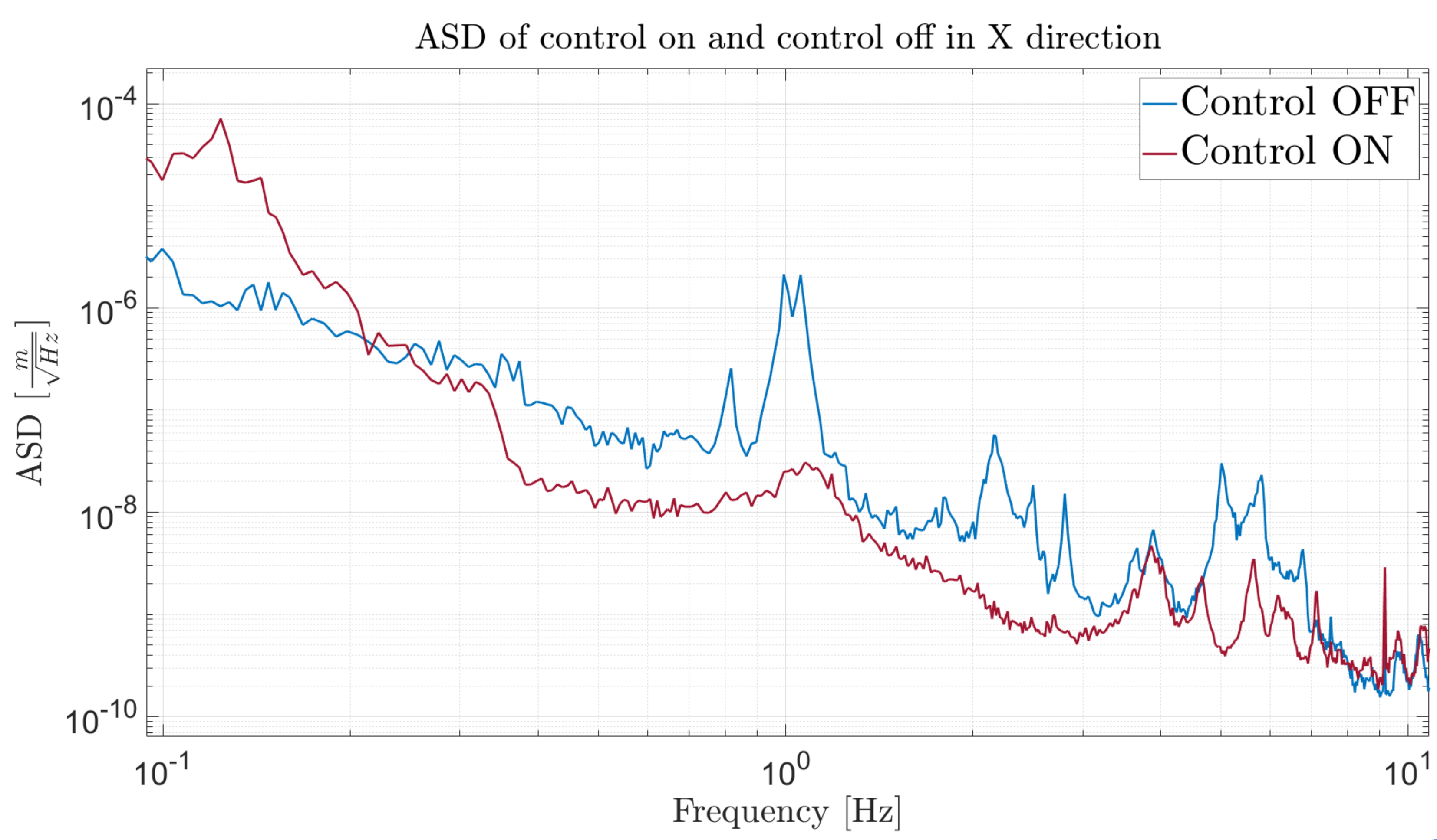
## Vertical sensors



Vertical Inertial sensor [4]

## Results

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