

## MECHANICAL ENGINEERING STUDENT SEMINAR

Thursday, December 12, 2024, at 13:00, D. Dan and Betty Kahn Building, Room 217.

Online: <https://technion.zoom.us/j/95793959558>

### External phase shifting tuning mechanism in a miniature pulse tube cryocooler using a semi-active viscous damping system

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Cryogenics is the science of producing and maintaining cold power at very low temperatures.

The practical products of cryogenics are closed-cycle refrigerators, or "Cryocoolers" in short.

There are several types of cryocoolers, the most common being the Stirling type cryocooler.

This cryocooler works in the same way as the Stirling cycle, with two pistons, one at the hot end and another at the cold end. It has been found that the piston on the cold side may cause several problems. To increase efficiency, a proposal was made to remove the cold end piston, and these special cryocoolers are named "Pulse Tube" (PT).

Following this proposal, the primary concern revolved around determining the most effective method to ensure synchronization between the mass wave and the pressure wave at the optimal phase difference between them.

In other words, one must find an alternative phase-shifting mechanism (PSM) to replace the cold piston.

Over the past years, many experiments and ideas have been tried in our laboratory to create the optimal PSM.

In this research, we established a proof of concept for a new tunable phase shift mechanism based on viscous damping. This research shows the whole process – from the idea, through the construction of the system, to the experiments and conclusions.

Note: the seminar will be given in Hebrew