

## ***Looped Thermoacoustic Cryocooler with Self-circulating Distributed Cooling***

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A self-circulating loop replaces the expansion heat exchanger as an extension to a previously discussed 450 Hz thermoacoustic cryocooler. A self-circulating loop allows for a distributed cooling load without requiring long-distance thermal conduction of heat. Instead, heat is transported by a steady flow of the working gas around a loop. Acoustic power directly provides the driving pressure for the circulation without requiring any moving parts and can work at low temperatures. A Venturi mechanism previously proven in a thermoacoustic waste heat recovery engine provides the driving pressure. Modelling a proposed system using thermoacoustic theory shows that the acoustic power dissipated driving the loop can be less than what would otherwise be dissipated in an expansion heat exchanger. Thus distributed cooling is possible with no loss of cooling capacity. The high frequency of operation enables a compact machine that is furthermore very low cost and ultra-reliable.