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## **SESSION 10: Stirling & Pulse Tube Cryocoolers - Experimental**

**Paper No. 10-2 Thursday Morning 8:15 AM**

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### ***Experimental Performance of a Passively Driven Displacer***

***H. Rana, M. Dadd, M.A. Abolghasemi, P. Bailey, and R. Stone,  
Department of Engineering Science, University of Oxford,  
Oxford, UK***

Stirling pulse tube cryocoolers (SPTCs) incorporate a warm end displacer into a pulse tube cryocooler, where previous studies have demonstrated that an active displacer integrated into an SPTC yields good performance and better efficiencies than pulse tube cryocoolers with inertance tubes. Using an active displacer that is driven by a motor requires a second phase from the power electronics. This results in an increased complexity of the design due to the extra motor and electrical feedthrough; hence it is preferable to have a passively driven displacer. This study presents the experimental testing and validation of a passively driven displacer integrated within a coaxial Stirling pulse tube cryocooler cooling to 80K. The pressure and harmonic driving forces of the displacer are analysed and validated with the theoretically modelled operation of the passive displacer. An insight into the mass flow, pressure pulse and phase angles is presented, providing an understanding into the passive displacer activity for work recovery in a coaxial Stirling pulse tube cryocooler.