

University of Wisconsin-Milwaukee

Dept. of Physics  
COLLOQUIUM

*Applications of AC Bridges  
in Cryogenic Measurements*

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**KIRC 1150 - Hybrid**

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AC (alternating current) bridges have proven to be useful in making precise measurements at low temperature, including thermometry as well as length change with respect to either thermal expansion (dilatometry) or applied magnetic field (magnetostriction). Techniques now in use allow one leg of the bridge to be placed at the cryogenic sample site while the other legs remain at room temperature, with the intervening temperature gradient being imposed along a length of coaxial cable. Using this method, length change measurements at atomic scale have recently been used to study a hidden order phase in the heavy fermion system  $URu_2Si_2$ . Plans are now underway to apply this sensitive measurement to a variety of single crystal and polycrystalline samples.

Relevant citing: S. Ran, G. M. Schmiedeshoff, N. Pouse, I. Jeon, N. P. Butch, R. B. Adhikari, C. C. Almasan & M. B. Maple; “Rapid suppression of the energy gap and the possibility of a gapless hidden order state in  $URu_{2-x}Re_xSi_2$ ,” *Philosophical Magazine*, 99:14, 1751-1762, DOI: [10.1080/14786435.2019.1600756](https://doi.org/10.1080/14786435.2019.1600756) (2019).

