

Abstract Submitted  
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**A ruthenium oxide thermometer for dilution refrigerators operating down to 5 mK**<sup>1</sup> SEAN MYERS, HONGXI LI, GABOR CSATHY, Purdue University — At the lowest temperatures achieved in dilution refrigerators, ruthenium oxide resistance thermometers often saturate and therefore lose their sensitivity. In an effort to extend the range of such temperature sensors, we built a thermometer which maintains sensitivity to 5 mK. A key component of this thermometer is an in situ radio frequency filter which is based on a modern rf absorption material. We show that the use of such a filter is only effective when it is encased in the same rf-tight enclosure as the ruthenium oxide sensor. Our design delivers an attenuation level that is necessary to mitigate the effects of parasitic heating of a fraction of pW present in our circuit. Furthermore, we show that the likely origin of this parasitic heating is the black body radiation present within the experimental space of the refrigerator.

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Sean Myers  
Purdue University

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