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ON THE UNCERTAINTIES IN THE DETERMINATION OF THERMODYNAMIC TEMPERATURE OF HIGH-TEMPERATURE FIXED-POINTS

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In July 2016 the Consultative Committee for Thermometry's Non-Contact Thermometry Working Group (CCT WG-NCTh) formed a task group to establish a comprehensive list of uncertainty components for determining the thermodynamic temperature, T, of high-temperature fixed-point (HTFP) cells and the cells use as thermodynamic temperature references, categorize them as well specified or requiring further investigation, and recommend areas of future research. In this paper we describe two paths to realizing T using HTFPs: one in which published values for the metal-carbon eutectic material transition temperatures are used and the other where a set of cells has their transition temperatures determined by primary radiometric thermometry. The uncertainty components of each path are listed, and realistically achievable values are given. We recommend that the high-temperature thermometry and radiometry communities try to improve their understanding of the furnace effect, and that low-uncertainty determinations of HTFPs other than Co-C, Pt-C and Re-C, such as Pd-C, WC-C and others, be made.