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On the Mystery of using Helium's Second Sound for Quench Detection of a Superconducting Cavity

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The detection of a second sound wave, excited by a quench, has become a valuable tool in diagnosing hot spots and performance limitations of superconducting cavity. Several years ago, Cornell developed a convenient detectors (OSTs) for these waves that nowadays are used world-wide. In a usual set-up, many OSTs surround the cavity and the quench location is determined by triangulation of the different OST signals. Convenient as the method is there is a small remaining mystery: taking the well-known velocity of the second sound wave, the quench seems to come from a place slightly beyond the cavity's outer surface. We will present a model that might help explaining the discrepancy.

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