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**Title:** Spaces of metrics of positive scalar curvature and parametrised Morse theory

**Abstract:** This semester we have had several talks on positive scalar curvature already and in this talk we will explore yet another aspect: the question of uniqueness of psc metrics. Phrased properly this is the study of the homotopy type of the space of psc metrics. One of the main tools used in its study is the index difference by Hitchin, which provides a map to K-theory. This map is known to be surjective on homotopy groups if the dimension of the manifold is at least 6.
In my talk I will explain the methods used to prove this non-triviality result and present enhancements, which allow for a simultaneous extension to dimension 5 and incorporation of the fundamental group (yielding an index difference mapping to the K-theory of group C\*-algebras). These enhancements use the original Madsen–Weiss theory and its extension by Perlmutter.