



Contribution ID: 3

Type: **not specified**

## Testing a point null hypothesis versus a continuous alternative hypothesis

*Monday, 19 October 2020 15:45 (30 minutes)*

I will discuss aspects of the frequentist and Bayesian approaches to testing a point null hypothesis (say  $\mu=0$ ) versus a continuous alternative hypothesis (say  $\mu>0$ ). This test arises frequently in particle physics, where  $\mu$  is the signal strength of a previously unobserved signal (within or beyond the Standard Model). The frequentist testing approach maps identically onto the frequentist theory of confidence intervals. Thus, as Feldman and Cousins eventually realized, the method advocated in their 1998 paper on confidence intervals maps identically onto the “classical” theory of likelihood ratio hypothesis tests in Kendall and Stuart (which in addition includes nuisance parameters). Meanwhile, the traditional Bayesian approach to hypothesis testing (due to Jeffreys) is completely separate from the Bayesian approach to credible intervals, with no corresponding mapping. Direct sensitivity to the prior pdf for  $\mu$ , even in the asymptotic limit of large sample size, is a consequence, as is the Jeffreys-Lindley paradox (arXiv:1310.3791). My talk will draw on parts of my “Lectures on Statistics in Theory: Prelude to Statistics in Practice” (arXiv:1807.05996).

**Presenter:** COUSINS JR, Robert (University of California Los Angeles (US))

**Session Classification:** Session 1