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Farrah C Yhee* (fyhee@umich.edu). *Ulrich modules do not always exist.*

Ulrich modules were introduced by Bernd Ulrich in 1984 and has since been a very active area of research. The existence of Ulrich modules for complete local domains have powerful applications. For example, existence implies Lech's conjecture: given a flat local map of local rings from R to S , the Hilbert-Samuel multiplicity of S is at least the Hilbert-Samuel multiplicity of R . Until recently, it was unknown if there were any counterexamples to the existence of Ulrich modules for (complete) local domains. In this talk, I will introduce the notion of Ulrich modules and discuss implications of their existence. Then I will give a counterexample to the existence of Ulrich modules for (complete) local domains. (Received March 08, 2021)