Nicholas R Baeth* (baeth@ucmo.edu) and Daniel Smertnig. A structure theorem for length sets in local quaternion orders.

If $R$ is a Noetherian ring, every non-zerodivisor can be written as the product of finitely many irreducible elements. However, this representation may not be unique. If $r$ is a non-zerodivisor of a ring $R$, the length set of $r$ is $L_R(r) = \{ n : r = a_1 \cdots a_n \text{ with each } a_i \text{ irreducible} \}$. Length sets and related invariants provide a measure of how non-unique factorization in $R$ can be. In this talk we introduce some of these invariants and show that, like classical orders in number fields, even though factorization can be highly non-unique, length sets of elements in local quaternion orders possess a great deal of structure. In particular we give a structure theorem for unions of sets of lengths in terms of almost arithmetical progressions. (Received August 15, 2017)