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Elongated Hoop Structures in Quasi-1D Tantalum Di-Selenide Crystals BEN BECK, Undergraduate Physics Student at University of Northern Iowa — Several novel topological crystal structures were discovered when performing scanning electron microscopy upon quasi-1D tantalum di-selenide crystals. The sample was comprised of mostly strand-like fibers with chemical compositions ranging from TaSe2 to TaSe3. These were randomly oriented as to create a macroscopic view akin to a matted nest. Upon further investigation of the sample, hoops and elongated hoop structures were discovered. The single hoops appeared to be comprised of a single strand connected at both ends. The elongated hoops most closely resembled spools of thread. The single hoops were most likely formed when a strand wrapped around a ball of liquid selenium during the formation of the crystals, as first discovered by Satoshsi Tanda of Hokkaido University. However, this theory does not adequately explain the formation of the elongated hoop structures, which have cylindrical interiors. These structures could be categorized in two different ways. Some were tightly wrapped much like a spool of thread while several resembled a slightly compressed spring. Currently, no clear theory has been developed for their creation, although we suspect inhomogeneities in the chemical stoichiometry to play a leading role.

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