1097-14-270 **Mirjam Cvetic*** (cvetic@physics.upenn.edu), Department of Physics and Astronomy, University of Pennsylvania, 209 South 33rd Street, Philadelphia, PA 19104-6396. *Elliptic fibrations with higher rank Mordell-Weil Group: F-theory compactifications with higher rank Abelian Gauge Symmetry.*

The construction of Abelian gauge symmetries in F-theory compactifications on elliptically fibered Calabi-Yau manifolds has been more elusive than the well studied non-Abelian cases. We present a systematic approach to engineer Abelian gauge factors in F-theory, by explicitly constructing general elliptic curves with rank two and three Mordell-Weil groups and their Calabi-Yau elliptic fibrations. Compactifications of F-theory on such Calabi-Yau spaces lead to U(1)xU(1) and U(1)xU(1)xU(1) Abelian gauge symmetry, respectively. We determine the full massless matter spectrum both in six and four dimensions and also in the presence of additional SU(5) Grand Unified Symmetry, by an explicit study of the co-dimension two singularities. We also obtain closed expressions for the four-dimensional chiral indices of matter representations in four-dimensions by formulating conditions on chirality-inducing G4-flux of dual M-theory compactifications. (Received January 24, 2014)