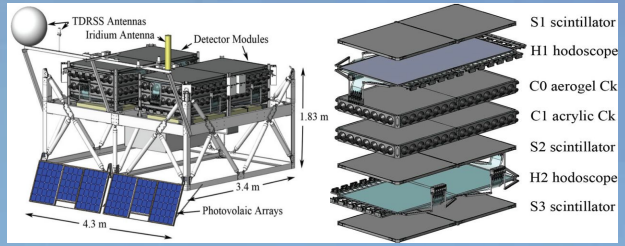
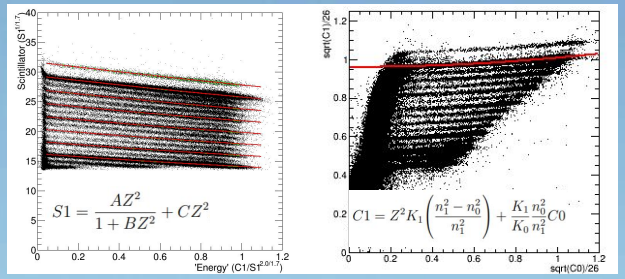
SuperTIGER Abundances of Galactic Cosmic Rays for the Charge Interval Z=41-56

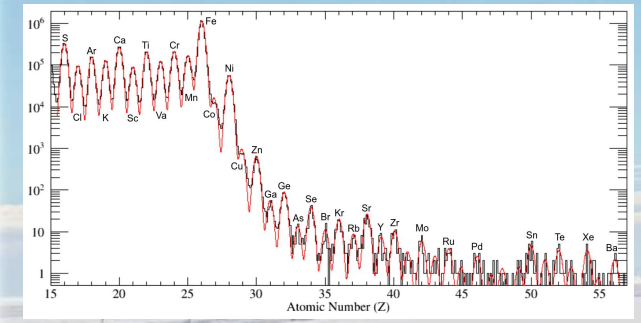
Nathan Walsh for the SuperTIGER Collaboration | ICRC 2021



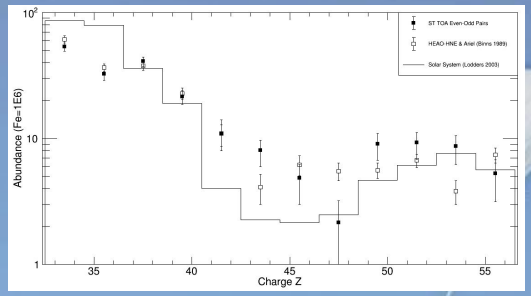
SuperTIGER (Super Trans-Iron Galactic Element Recorder) is designed to measure ultra-heavy galactic cosmic rays (GCR) and probe their source and acceleration mechanism.



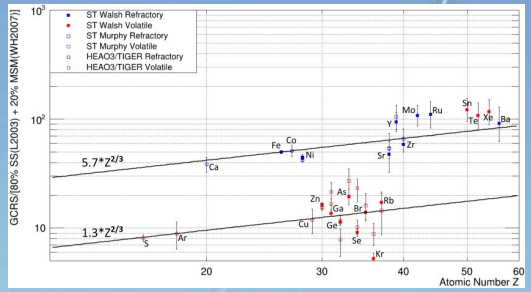
A low-energy (left) and a high-energy (right) charge assignment method is used to extrapolate the *Z* dependence of detector signals to higher signal space, where high-*Z* events appear but charge bands are not visible.



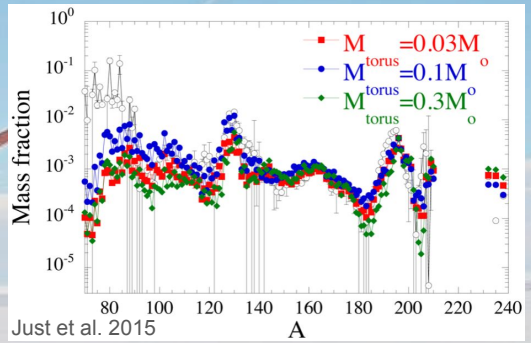
Elements with *Z*>40 shows well defined peaks at even-*Z* elements but very low statistics and lack of clear element resolution at odd-*Z* elements.



There is good consistency between the newly measured charge range and satellites HEAO-3 & Ariel that did not have individual element resolution and thus measured odd-even charge pairs.



The GCRS abundances suggest that the preferential acceleration of refractory elements by OB SNe, seen for GCR with *Z*≤40, does not hold for *Z*>40. Instead, the volatiles are bumped up to the refractory line.



Binary neutron star mergers (BNSM), are known to produce vast amounts of r-process nuclei in a single event. Interestingly, the BNSM r-process production falls off for *Z*<40 (*A*<~90), which is the point where the GCR source model appears to change.