Research efforts by MIT have shown that epithermal neutron beams can be used in time-of-flight (TOF) mode to achieve verification of nuclear Treaty Accountable Items (TAI) in a physically cryptographic manner. Furthermore, efforts by MIT and Princeton , as well as more recent collaborative efforts between PNNL and MIT have shown that compact, DT-generator based beams can be used to differentiate between various fissile isotopes. However, some skeptics have speculated that spectral information acquired during such measurements may contain information which, hypothetically, may be used to infer knowledge about the device composition.

One approach pioneered and championed by the national labs which addresses the problem of "excessive" information involves the use of Information Barriers (IBs). IBs however merely shift the burden of the verification from the TAI to the IB itself: one must check that the IB does not contain backdoors or other vulnerabilities. This is an impossible task, as the IBs contain integrated circuits with millions of components in the ~50nm scale – much smaller than the resolution of common X-ray imaging techniques. Some colleagues at Princeton have proposed a concept of "vintage verification," which use 1980s well aged IBM computers to mitigate the problem of nano-scale and digital complexity.

Here we propose an approach which abandons the digital realm entirely. Instead of using digital electronics, we propose a system consisting of a limited number (40-100) of analog electrical components, such as ~cm scale resistors, capacitors, and bipolar junction transistors. The system filters the TOF signal. This encrypting system will gate on individual isotopic resonances of choice, block the rest, and produce simple TTL signals, which then can be counted by analog counters. All these components can be easily verified, e.g. by destructively assaying them or X-raying to verify that no "analog hacking" is present. We believe that this approach amounts to an effective Zero Knowledge Proof system: it will significantly increase the trustworthiness of the overall system and thus be more attractive in a treaty verification regime. The concept and some simulation results will be presented.