

We have previously studied Zero-Knowledge-Protocol (ZKP) differential neutron radiography for warhead verification, using superheated droplet (bubble) detectors. We successfully showed the proof-of-concept using one dimensional radiography experiments. In this study, we conducted calculations and preliminary experiments with a test object with full 3D structure (64 voxels) combined with 2D radiography. The baseline target object is a 4x4x4 cube. We can swap elements in the center of the cube to test the sensitivity of the system. A total of 16 bubble detectors were located behind the target in a 4x4 grid. We used 14 MeV neutrons coming from the "EXCALIBUR" neutron source available at the Princeton Plasma Physics Laboratory, which allows rapid measurements. Also, we propose a real-time confirmation system using radiographic image on 2D scintillators and a digital camera. This method works with complements (printed on a film) to create flat real-time image containing no information.