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Non-metallic cryogenic sealing and actuating devices for systematic studies apparatus at NC State for the neutron Electric Dipole Moment Collaboration AUSTIN REID, KAREN DANIELS, PAUL HUFFMAN, EKATERINA KOROBKINA, KENT LEUNG, MITHI A. DE LOS REYES, CAMEN ROYSE, North Carolina State University — We are developing a small-scale apparatus at NC State's ultracold neutron source to measure several systematic effects for the neutron electric dipole moment (nEDM) experiment. The apparatus will utilize both polarized 3He and UCN in the same measurement volume and allow one to measure the correlation functions that predict the geometric phase effect, optimize the parameters for critical dressing, and investigate the pseudomagnetic field caused by UCN scattering from polarized 3He. NMR techniques will be used to control the polarization of 3He and UCN, limiting the use of conducting material in the experimental volume. Due to this constraint we have developed nonmetallic detachable seals and a nonmetallic bellows that are superfluid helium tight. Kapton is flexible below 2K and can be folded with an origami pattern into a flexible and robust bellows capable of hundreds of actuation cycles without failure. Details of the apparatus as well as the bellows will be presented.

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