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Measurement of Berry's Phase in Microscopic -Triaxial Cracking Excitations HAMED O.GHAFFARI, University of Texas (Arlington), W. ASHLEY GRIFFITH, 1Department of Earth Sciences, University of Texas, Box 19049, Arlington, TX, 76019, USA, WILLIAM FLYNN, Applied Seismology Consultants, Shrewsbury, UK, R.PAUL YOUNG, Department of Civil Engineering and Lassonde Institute, University of Toronto, Canada — Many intractable systems can be reduced to a system of interacting spins. Here, we introduce a system of artificial acoustic spins which are manipulated with ultrasound excitations from microcracking sources with three control parameters in a 3D inhomogeneous confined stress field. We evaluate the evolution of the order parameter visualized as dancing strings constructed from time series collected using multi-array ultrasound sensors. We study the adiabatic cyclic change of the order parameter of the system due to rotation of the pseudo-stress field. We show that the order parameter acquires a geometric phase factor in addition to the dynamic phase known as Berry's phase. We demonstrated the accumulation of a geometric phase in the "k-chains" and show that the system can be manipulated geometrically by means of microscopic ultrasound radiation of cracking excitations and observed the real-time accumulated phase. We found that the observed geometric phase is an excellent agreement with Berry's predictions. The introduced acoustic-spin system opens new horizon to study other aspects of spin-systems including different time characteristics of relaxation phases, topological phases induced by driving and stress-quenched induced defects.

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