Fiscal Year:	FY 2022	**Task Last Updated:**	FY 12/21/2021
PI Name:	Weeks, Eric R Ph.D.		
Project Title:	Thermal Fluctuations of Colloidal Gels		
Division Name:	Physical Sciences		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	COMPLEX FLUIDS/SOFT MATTER--Complex Fluids		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	30322-2430	**Congressional District:**	5
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2020 Physical Sciences NNH20ZDA014N: Use of the NASA Physical Sciences Informatics System--Appendix G
Start Date:	12/01/2021	**End Date:**	11/30/2023
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA GRC
Contact Monitor:	Urban, David	**Contact Phone:**	216-433-2835
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):			
Grant/Contract No.:	80NSSC22K0292		
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Performance Goal Text:			

Task Description:	We propose to study colloidal gels using the data from the Advanced Colloids Experiment-Microscopy-1 (ACE-M-1) experiments. Colloidal gels are formed from sticky micron-sized solid particles in a liquid, where over time the particles stick together and form random clumps that eventually bridge across the entire sample chamber in tangled networks. The ACE-M-1 data set consists of a large number of optical microscopy movies of colloidal gels. In microgravity, these gels are long-lived, rather than collapsing under their own weight as happens in ground-based experiments. Our group has expertise in analyzing microscope images, using particle tracking, particle image velocimetry, and differential dynamic microscopy. The movies reveal the gels have visible thermal fluctuations that likely reveal information about their rheological properties, local elasticity, etc. There is also some clear sense of length scales: some gels have thick aggregated regions, while others have more tenuous gel strands and free particles. We can connect structure and dynamics. We propose to analyze these movies to pull out this information, and to perform complementary ground-based experiments to validate the observations. For example, the Physical Sciences Informatics (PSI) movies are all 2D cuts through 3D samples, and we will use ground-based confocal microscopy to cross-check the samples with some 3D data sets; to confirm inferences about 3D structure from the 2D images. A particular appealing feature of the ACE-M-1 experiments is that they studied polydispersity (gels made of mixtures of two distinct particle types) and polydisperse systems are a long-time interest of the Principal Investigator (PI). We will use our ground-based experiments to study gels with higher polydispersity, which should in turn suggest new microgravity investigations in the future. This PSI investigation will be done by the Weeks lab at Emory University; there will not be any other collaborators.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2022.
Bibliography Type:	Description: (Last Updated: 08/07/2014)