

## Bulletin of the American Physical Society

### APS March Meeting 2022

Monday–Friday, March 14–18, 2022; Chicago

#### Session M63: Heavy Fermions II

8:00 AM–10:48 AM, Wednesday, March 16, 2022

Room: Hyatt Regency Hotel -Grant Park A

Sponsoring Unit: DCMP

Chair: John Singleton, NHMFL/ LANL

#### Abstract: M63.00004 : Effect of hybridization gap on the phononic and electronic excitations of CeCoIn<sub>5</sub>\*

8:36 AM–8:48 AM

← Abstract →

#### Presenter:

Mai Ye

(Rutgers University)

#### Authors:

Mai Ye

(Rutgers University)

Hsiang-Hsi Kung

(University of British Columbia)

Priscila Rosa

(Los Alamos National Laboratory)

Eric D Bauer

(Los Alamos Natl Lab)

Girsh E Blumberg

(Rutgers University, New Brunswick)

Heavy fermion metal CeCoIn<sub>5</sub> has a coherence temperature  $T^*=45\text{K}$ , below which individual Kondo singlets evolve into a coherent Kondo lattice [P. Coleman, *Introduction to Many-Body Physics* (Cambridge University Press, 2015)]. In this process, localized electrons acquire an effective intersite coupling mediated by conducting electrons, and gradually form a narrow band. The interaction between the narrow band and conduction band in turn opens up a hybridization gap. We study the phononic and electronic excitations of this compound by inelastic light scattering. Two optical phonon modes exhibit anomalies in their temperature dependence of frequency and linewidth below  $T^*$ , indicating reduced electron-phonon scattering resulting from gap opening near the Fermi level. Moreover, below  $T^*$  the continuum of electronic excitations in the XY scattering geometry is suppressed following cubic power law in frequency up to  $50\text{cm}^{-1}$ . Such cubic-power-law behavior is absent in other scattering geometries. These results support  $T^*$  as the characteristic temperature marking the development of long-range coherence for individual Kondo singlets and the opening of hybridization gap.

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