**Melting Temperatures of Different Solid Phases Near =1**

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**Introduction**

At the termination of the fractional quantum Hall effect (FQHE) series below Landau filling factor ** =1/5 a two- dimensional electron system forms a Wigner solid (WS). In high magnetic field, such a solid exhibits a microwave or rf pinning mode, which is a collective oscillation of pieces of the solid about their pinned positions. Using the pinning mode to study the melting temperature, *T*m, of the ** WS, ref. [1] showed that *T*m decreases with ** In the **-region of an integer quantum Hall effect (IQHE) plateau the microwave spectrum of a two-dimensional electron system exhibits the pinning mode of an insulating WS of quasiparticles and –holes [2], in the presence of one or more full Landau levels. Recent microwave measurements in wide quantum wells (WQWs) [3] have revealed a solid-solid phase transition between a WS (which we call S1) that is found with **nearest to ** = 1, and a second WS (S2) associated with a reentrant integer quantum Hall effect, and existing at **further from . Here we report an investigation of the melting temperature of these two solids, carried out by study of the pinning mode.

**Experimental**

We obtain diagonal conductivity of the carriers in the WQW from the measured loss and phase shift of a transmission line which is patterned onto the sample surface and which is capacitively coupled to the electron system.

**Results and Discussion**

To obtain the melting temperature, *T*m, of the Wigner solid, we obtained microwave spectra, Re (**xx) versus *f*, at fixed ** at two different densities (*n*) at various temperatures. At each ** we extract the peak Re (**xx) as a function of temperature. We define *T*m as the temperature at which the peak Re (**xx) extrapolates to zero. Fig. 1 (a) and (b) show *T*m vs ** for the two different densities as marked. S2 is present only for ** < 1 in Fig. 1(a), and for ** > 1 in Fig. 1(b). *T*m vs ** for S1 and S2 have different characteristics.

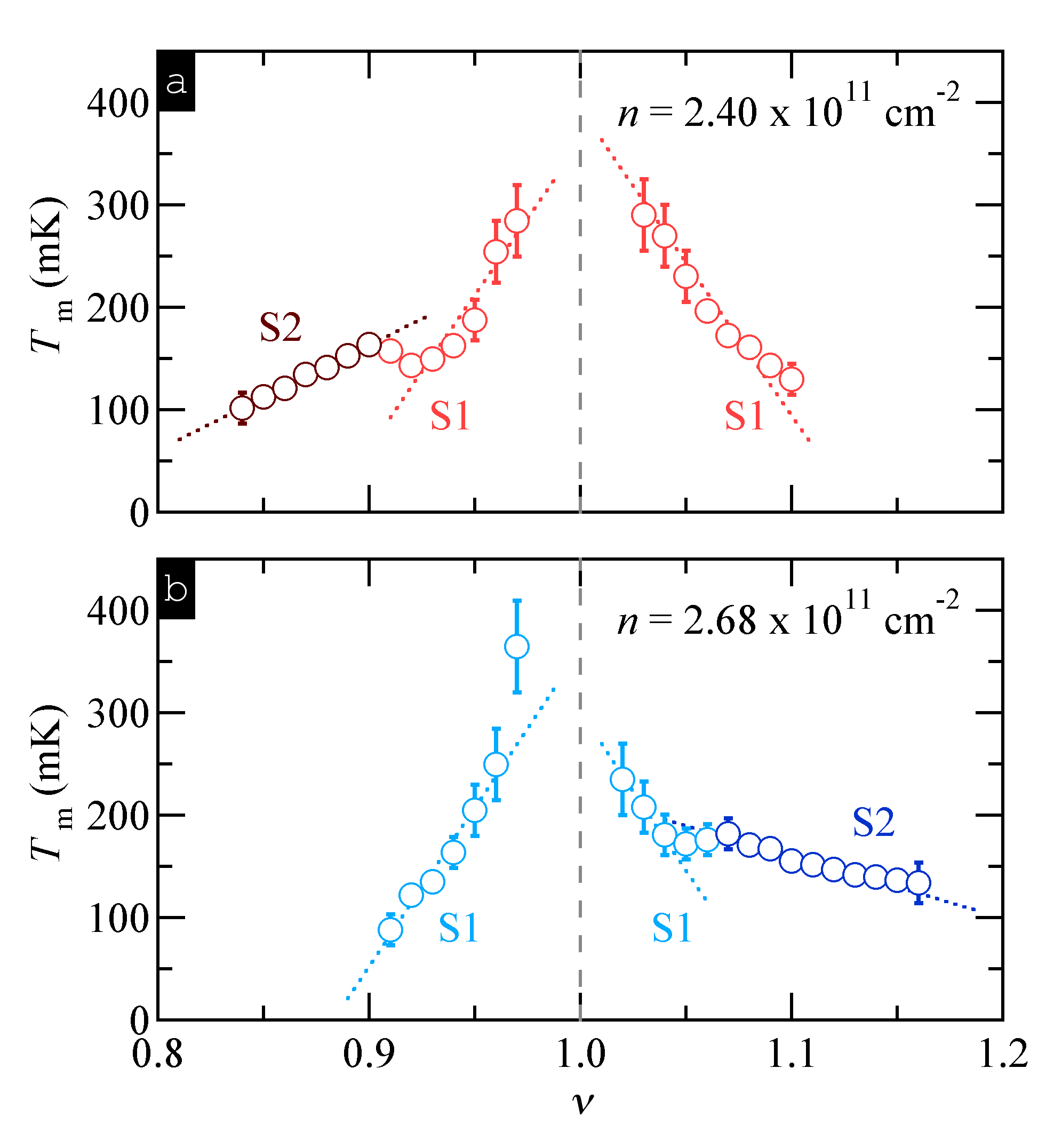


Figure 1: Melting temperature near ****vs ** for two different densities, *n* in a 65 nm wide quantum well.

While *T*m increases as ** =1 is approached for both solids, *T*m  for S1 increases more rapidly. The different slope of *T*m ** underscores that the two solids are distinct, microscopically different phases. The presence of a transition was previously gathered from peak frequency vs ** measurements [3]. The solids are likely made up of different types of carriers, with S2 containing 2-flux composite fermions, (CFs) in the presence of one completely full CF Landau level [4]. S1 may contain 4-flux composite fermions. The different interactions between the constituent carriers of the two solids then can give rise to the observed different melting behaviors.

**Acknowledgements**

This work was supported by DOE BES award DE-FG02-05ER46212. A portion of this work was performed at the National High Magnetic Field Laboratory, which is supported by National Science Foundation Cooperative Agreement No. DMR-1157490 and the State of Florida.

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