



**Figure S1.** Temperature dependence of inelastic neutron scattering data around the (2 0 0) Bragg peak. Panels (a) and (b) are identical to panels (a) and (e) in Figure 5 of the main article, which were obtained at  $T = 200$  K. (c) Same as (a) but measured at  $T = 10$  K. (d) Same as (b) but measured at  $T = 10$  K. One can clearly see the suppression of phonon intensities at lower temperatures, except for the lowest-lying linear branch. This branch originates from the tail of the strong (2 0 0) Bragg peak.