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Listening in on Friction: Stick-Slip Acoustical Signatures in Velcro SEBASTIAN HURTADO PARRA, LESLIE MORROW, MILES RADZIWANOWSKI, PAUL ANGIOLILLO, Saint Joseph's University — The onset of kinetic friction and the possible resulting stick-slip motion remain mysterious phenomena. Moreover, stick-slip dynamics are typically accompanied by acoustic bursts that occur temporally with the slip event. The dry sliding dynamics of the hook-and-loop system, as exemplified by Velcro, manifest stick-slip behavior along with audible bursts that are easily micrphonically collected. Synchronized measurements of the friction force and acoustic emissions were collected as hooked Velcro was driven at constant velocity over a bed of looped Velcro in an anechoic chamber. Not surprising, the envelope of the acoustic bursts maps well onto the slip events of the friction force time series and the intensity of the bursts trends with the magnitude of the difference of the friction force during a stick-slip event. However, the analysis of the acoustic emission can serve as a sensitive tool for revealing some of the hidden details of the evolution of the transition from static to kinetic friction. For instance, small acoustic bursts are seen prior to the Amontons-Coulomb threshold, signaling precursor events prior to the onset of macroscopically observed motion. Preliminary spectral analysis of the acoustic emissions including intensity-frequency data will be presented.

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