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Nanometer Vibration Analysis for Future Linear Colliders STEVEN SCHRAMM, KEVIN MCLEOD, JANIS MCKENNA, THOMAS MATTISON, Univ. British Columbia — Future linear electron-positron colliders require nanometer beam sizes for adequate luminosity, so mechanical vibrations at the nanometer level are a critical issue. One approach is measuring component (or accelerometer test-mass) positions with laser interferometry, which has sub-nanometer resolution. The position information is then input to a state-vector control algorithm for use in adjusting component positions, steering the beam, or simply as diagnostic information. Fourier analysis of our test interferometer data shows dominant contributions from many relatively narrow peaks, plus frequency-dependent broadband noise. We have developed automated methods of analyzing such data to produce the information required for the state-vector algorithm to predict future motion and also to control it.

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