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Observation of the back-bending dispersion of waveguide exciton polaritons in $MoSe_2$. ZHE FEI, FENGRUI HU, Iowa State University — We report on a real-space nanoimaging study of exciton polaritons in $MoSe_2$ planar waveguides using the scattering-type scanning near-field optical microscopy. These polaritons are generated due to the coupling between waveguide photons with excitons in $MoSe_2$ and they show sensitive dependence with the waveguide thickness and orientation. By measuring the mode wavelengths at various excitation energies, we were able to construct the mode dispersion relation, which shows a back-bending feature close to the exciton. Our theoretical analysis indicates that such an anomalous dispersion is the signature of polaritons subject to damping. The mode damping drops rapidly at lower energies away from the excitons, where the waveguide modes can propagate tens of microns.

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