Supplemental Information

# A Brownian Ratchet Model Explains the Biased Sidestepping of Single-Headed Kinesin-3 KIF1A

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SUPPLEMENTARY FIGURES
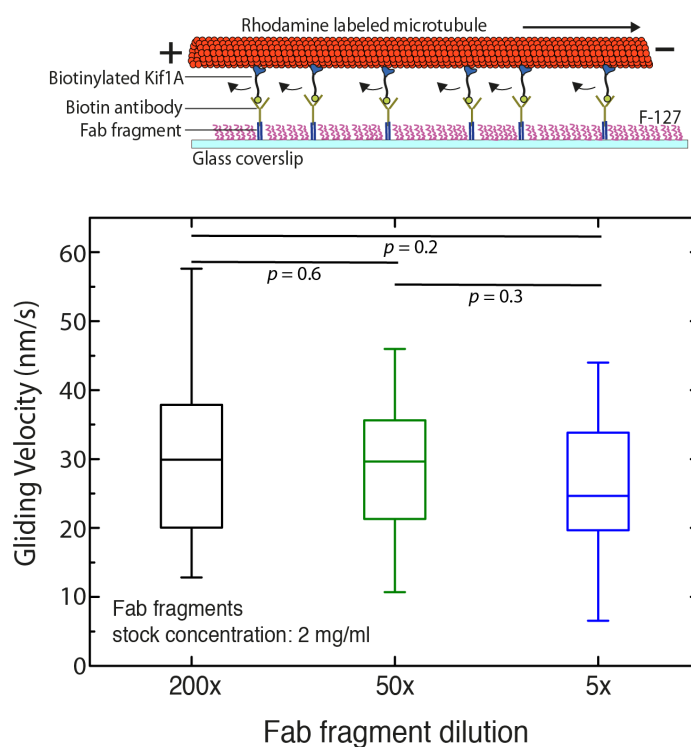
Supplementary Figure 1: Gliding velocity of microtubules as a function of the density of Fab fragments. The velocity of microtubules gliding on KIF1A motors does not vary significantly with density of motors attached to the substrate. The figure shows box plots of microtubule gliding velocity for different Fab fragment dilutions (200x, 50x and 5x: stock concentration – 2mg/ml). The Fab fragment concentration determines the KIF1A motor density on the surface. Finally, the p-values were obtained using the Mann-Whitney U Test.
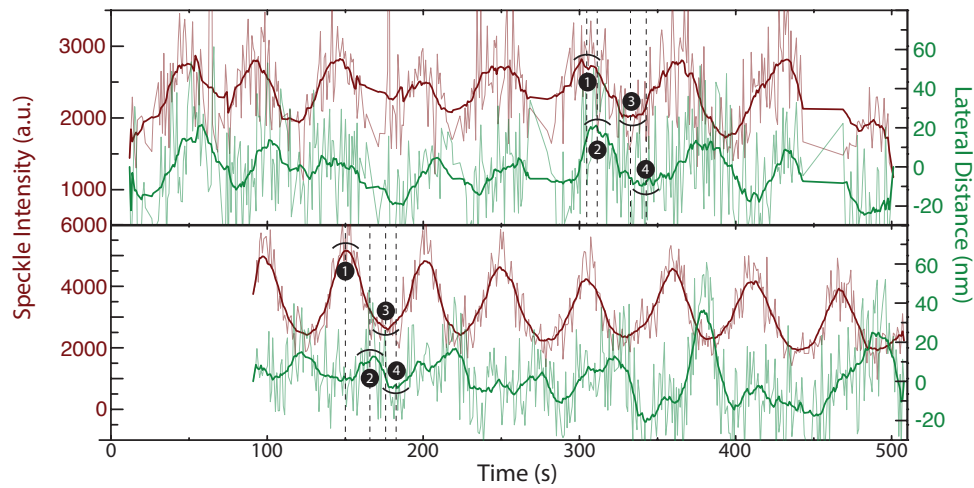
Supplementary Figure 2: Direction of rotation of the microtubules gliding on KIF1A motors. Two individual speckles from two gliding speckled microtubules were tracked using FIESTA to obtain the lateral deviation of the speckle along with the variation in FLIC intensity over time. The direction of rotation was determined to be counterclockwise (in the direction of motion) from the temporal sequence of the 3D position of the speckle. Raw data is indicated in light grey and the smoothened data (rolling frame averaged over 20 frames) is indicated in green (lateral distance; positive values refer to the left) and brown (FLIC intensity). The numbers correspond to different positions on the microtubule surface (see Figure 1D, inset).
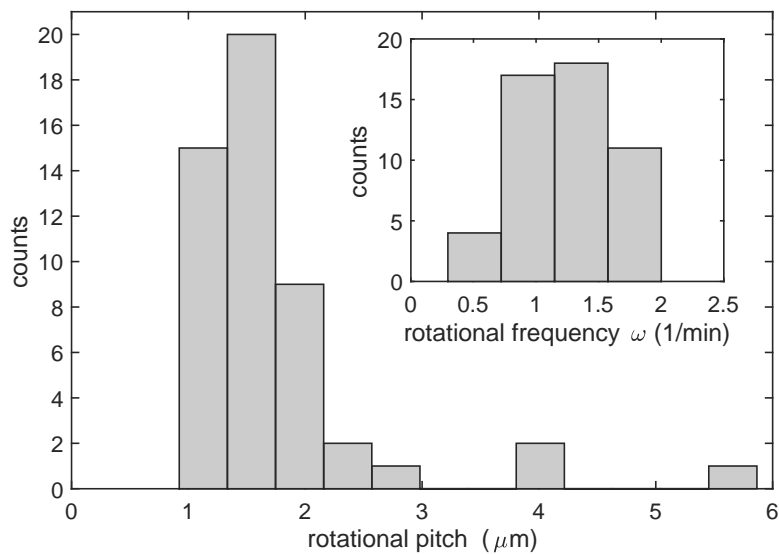
Supplementary Figure 3: Distribution of the rotational pitch P and the rotational frequency ω (inset) for the simulation results in Fig. 5 in the Main Text (blue data).