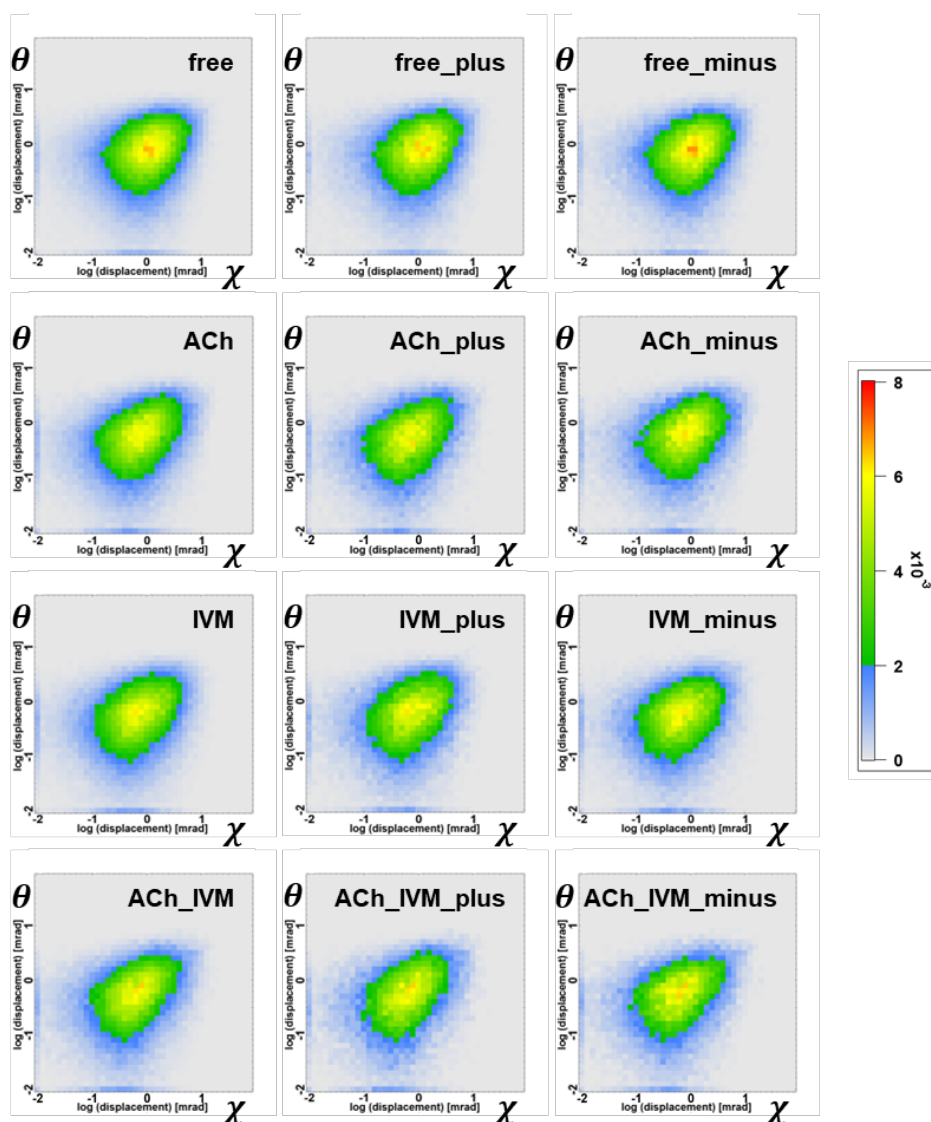
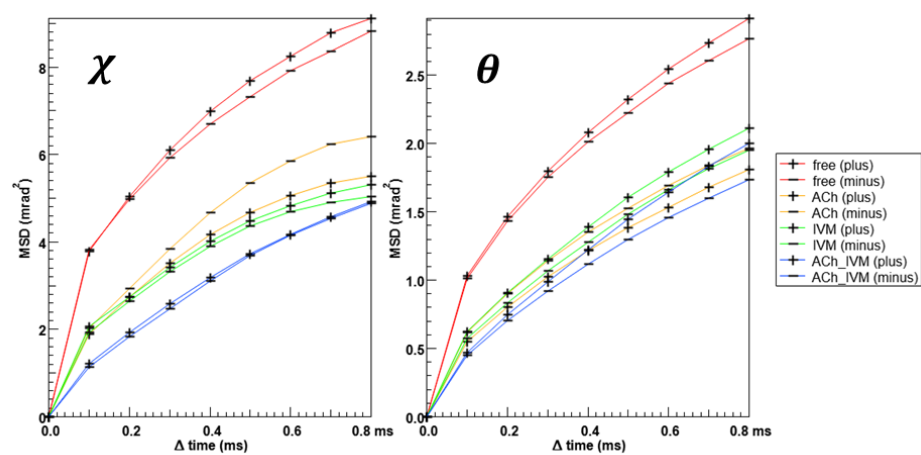


# Supplementary Figures:



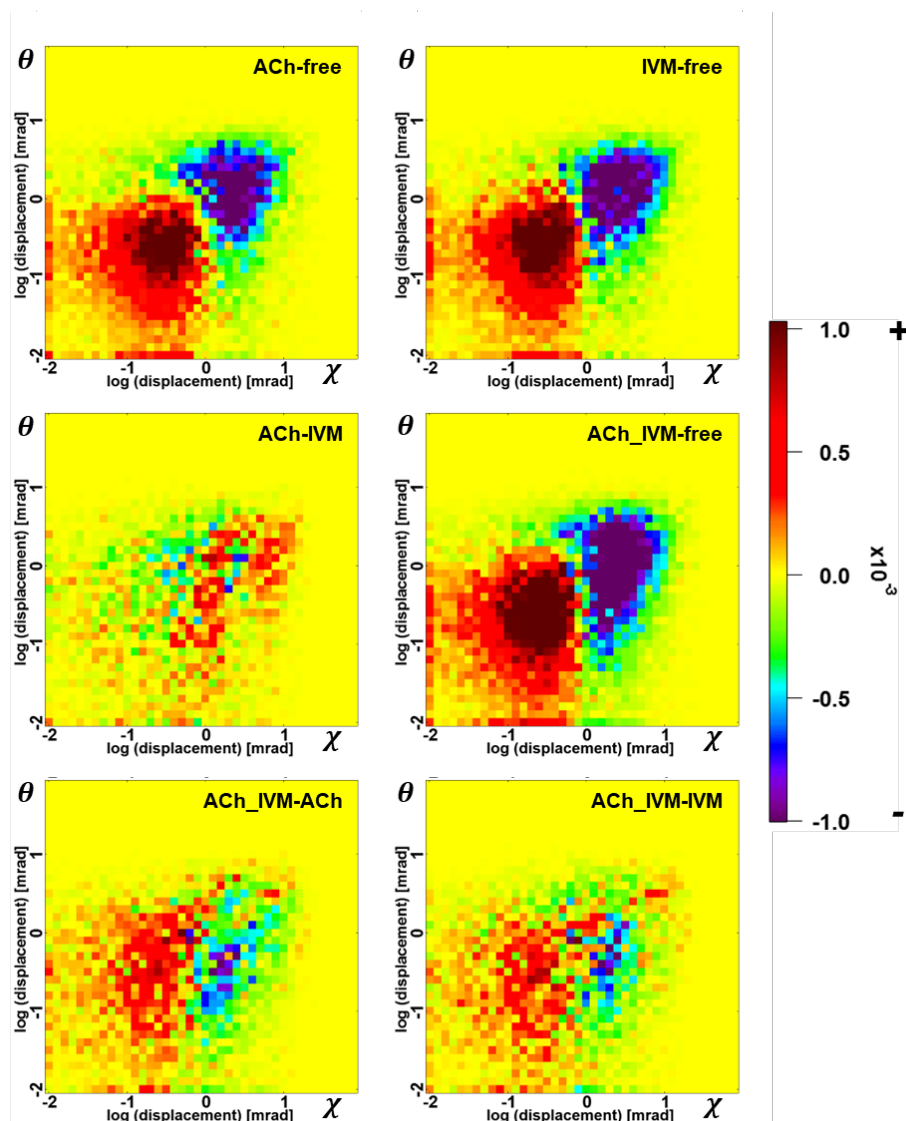
**Supplementary Fig. S1. Normalized 2D motion maps.**

Normalized 2D motion maps of nAChR  $\alpha 7$  in normal, positive and negative directions of the  $\chi$  axis in all conditions.



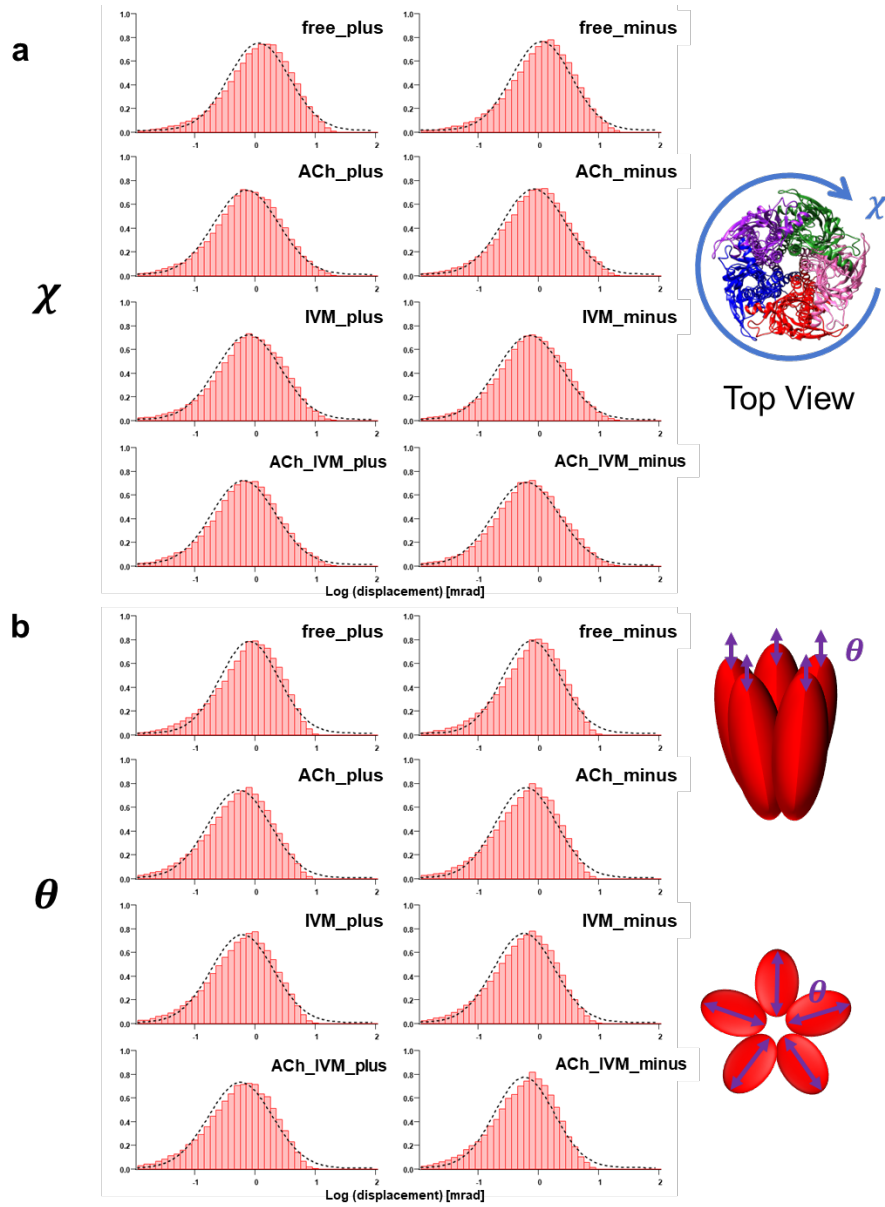
**Supplementary Fig. S2. MSD curves.**

MSD curves of twisting and tilting motion of nAChR  $\alpha 7$  in the positive and negative directions of the  $\chi$  axis in all conditions.



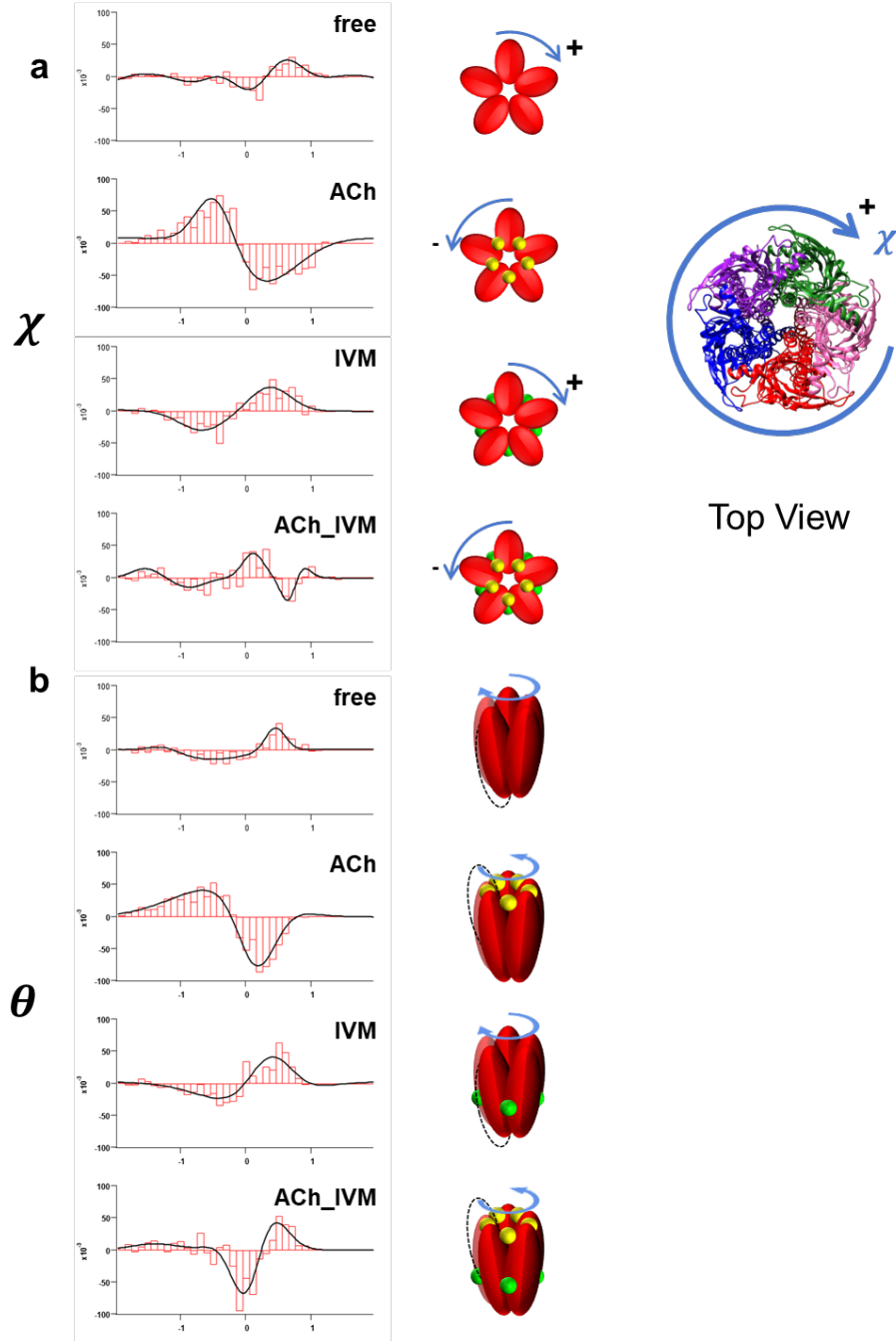
**Supplementary Fig. S3. Difference 2D motion maps.**

Difference 2D motion maps between two experimental conditions.



**Supplementary Fig. S4. The angular displacement distributions.**

The angular displacement distributions of twisting (**a**) and tilting (**b**) motions of nAChR  $\alpha 7$  in the positive and negative directions of the  $\chi$  axis in all conditions.



**Supplementary Fig. S5. Difference angular displacement distributions.**

The fitting of difference angular displacement distributions between the positive and negative directions of twisting motion (**a**) and tilting motion (**b**) at this point for all conditions.