Charge Density Wave State Suppresses Ferromagnetic Ordering in VSe$_2$ Monolayers

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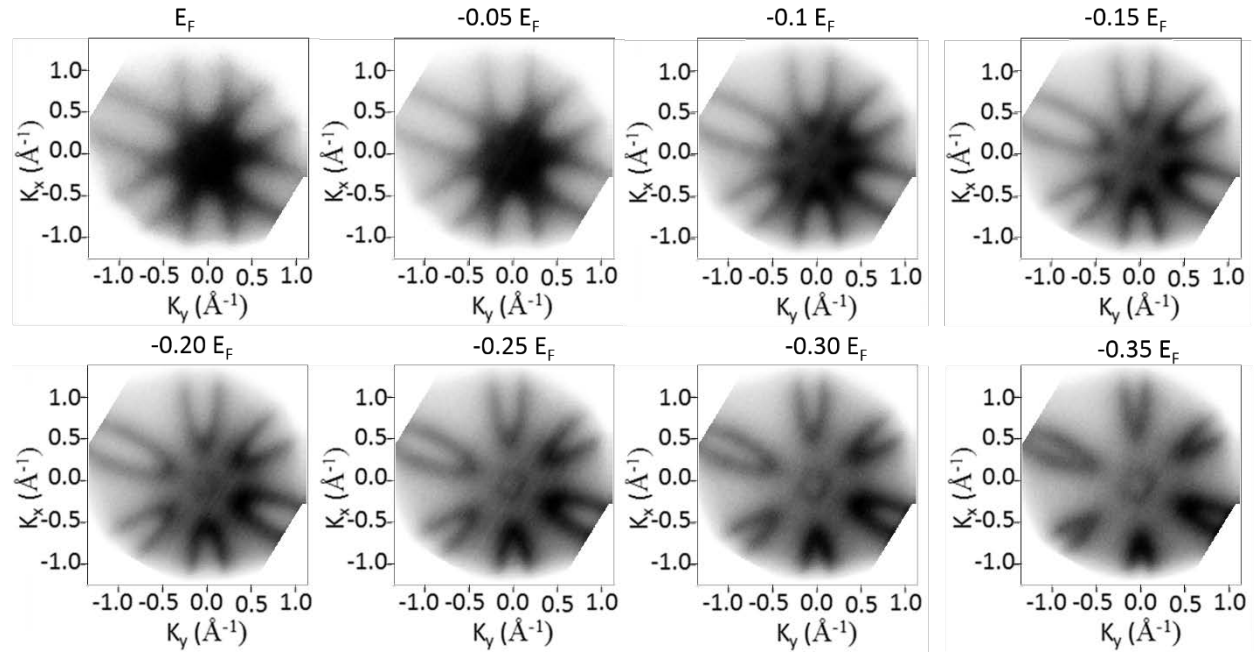
Fig. S1: Constant energy surfaces at different binding energies relative to the Fermi-level.

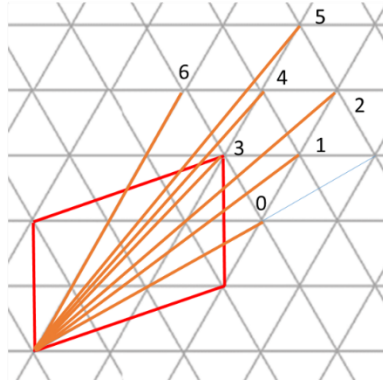| Commensurate nesting vectors	Real vector length (in units of a)	Rotation angle	Reciprocal vector length (in units of a*)	Reciprocal vector length (in Å^{-1})	Experimental separation of the Fermi-sheets (in Å^{-1})	Mismatch
0	2√3	30°	0.29	0.62	0.56	-10%
1	√19	23.4°	0.23	0.5	0.56	+11%
2	√28	19.1°	0.19	0.41	0.57	+28%
3	√13	13.9°	0.28	0.6	0.58	-3%
4	√21	10.9	0.22	0.47	0.59	+20%
5	√31	8.9°	0.18	0.39	0.60	+35%
6	4	0°	0.25	0.54	0.65	+17%

Fig. S2: Comparison of how well possible CDW vectors fulfill the Fermi-surface nesting condition. Different real space commensurate real space vectors are shown and their labels correspond to the values in column 1 of the table. Column 2 shows their real space length and column 3 their rotation angle. Column 4 and 5 show the reciprocal vector length in units of reciprocal lattice constant and Å^{-1}, respectively. This length may be compared to the measured separation of the Fermi-sheets along the direction of the reciprocal vectors. The last column of the table shows the discrepancy of the reciprocal vector length with the separation of the Fermi-sheets. It can be seen that the reciprocal vector of the real space √13R19.1 vector matches the Fermi-nesting condition best. This vector corresponds to the diagonal of the √3R30 x √7R19.1 primitive CDW unit cell. Thus this analysis would conclude that the observed CDW unit cell is the one with the best nesting condition of any commensurate CDW vector.