Electronic Supplementary Material (ESI) for Faraday Discussions. This journal is © The Royal Society of Chemistry 2020



## Figure S1: Soluble proteins.

(A-D) Time trace of minimum distance values for each replica, between ubiquitin and bilayers of different compositions at both values of fc.

(E-H) Time trace of minimum distance values for each replica, between HEW Lysozyme for and bilayers of different compositions at both values of fc.

Lipid compositions and fc values are mentioned in the title above each plot.



## Figure S2: PDK1 PH Domain.

Time trace of minimum distance values between the PDK1 PH domain and bilayers of different compositions at both values of fc.





Time trace of minimum distance values between the Evectin-2 PH domain and bilayers of different compositions at both values of fc.



Figure S4: Lactadherin C2 Domain.

Time trace of minimum distance values between the Lactadherin C2 domain and bilayers of different compositions at both values of fc.

Α							В							
	FVa C2 Domain - fc 500; DOPC						FVa C2 Domain - fc 1000; DOPC							
(uu)							ennin.	M			M/*	WAR WAR	M.M.	
mbrane	Enternante and							WM WWW		WANNIN	A MARKAN	Million Million	4LANN	
and me							A.M.A.H	MV MV MV	Munthing	www.wh		in the second	M.J.A	
protein	E.Murthanantimanantimanan Min							hun MM	Lad Vinni Min		Munnama	mmu		
list. btw		ANAMAAAAM	W	AMM_M	h.H.	list. btw	ËV/Mar/	VAN WAY	MMMM	MAM	MAMM	MWMM	wm.m	
Min. d									CAMPANIA.		william			
	0 500	1000 1500 Time (n	2000	2500	3000		0	500	1000	1500 Time (ne)	2000	2500	3000	
С	FVa C2 Domain - fc 500: 80% DOPC 20% DOPS						D	EV/a (	2 Domain - fc	1000· 80% F		OPS		
						<u> </u>				1000, 80% L	JOFC, 20% D	0F5	il i.	
mu) e						un "	EWW.							
mbrane	But was an and the second of t					mbrane • ± % # +		WAR WAR		Min Min	m.M			
and me	Enternation and an and a second a							ML						
protein								Marshan	while Mark	ANIM ANAL		1		
ist. btw	Mandal And Marked Ma							MANNA	MMM when her	MMMM	Minun	WWWWW	WM NA	
Min. d		MAMANAN	MUNIMAL MAN	NHI MAAYAA WAA	M	Min. d	<b>Pality Mile</b>	WMWWWW	Manmah Man	u				
	0 500	1000 1500 Time (n	2000 S)	2500	3000		0	500	1000	1500 Time (ns)	2000	2500	3000	

# Figure S5: FVa C2 Domain.

Time trace of minimum distance values between the FVa C2 domain and bilayers of different compositions at both values of fc.



#### Figure S6: PLA<sub>2</sub>.

(A-F) Time trace of minimum distance values between  $PLA_2$  and bilayers of different compositions at both values of fc. (G) Probability density distribution of protein-membrane minimum distances in DMPC lipid bilayer at fc = 500 kJ/mol/nm<sup>-2</sup>. (H) Percentage of binding of  $PLA_2$  at different membrane compositions.



## Figure S7: Arf1 protein.

Time trace of minimum distance values between the Arf1 protein in the GDP-bound (A,B) or GTP-bound conformer (C,D) and bilayers of different compositions at both values of fc.



#### Figure S8: Ricin.

Time trace of minimum distance values between the ricin and bilayers of different compositions at both values of fc.



### Figure S9: Mastoparan.

(A-F) Time trace of minimum distance values between Mastoparan and bilayers of different compositions at both values of fc.

(G-I) Probability density distribution of protein-membrane minimum distances for different lipid bilayers



Figure S10: Osh4 ALPS peptide.

(A-F) Time trace of minimum distance values between the Osh4 ALPS peptide and bilayers of different compositions at both values of fc.

(G-I) Probability density distribution of peptide-membrane minimum distances for different lipid bilayers



#### Figure S11: ArfGAP1 ALPS peptide.

(A-F) Time trace of minimum distance values between the ArfGAP1 ALPS peptide and bilayers of different compositions at both values of fc.

(G-I) Probability density distribution of protein-membrane minimum distances for different lipid bilayers