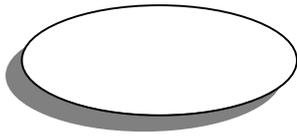


SMALL CELLS: CURVATURE - DRIVEN LYSIS

A FREE BILAYER EDGE COSTS ENERGY

WHAT IS THE MAXIMUM SIZE OF A DISK-SHAPED MEMBRANE?



$$E_{\text{DISK}} = 2 R_D \lambda$$



$$E_{\text{SPHERE}} = 8 \kappa_b + \text{gaussian term}$$

SPHERE PREFERRED IF

$$\begin{aligned} E_{\text{DISK}} &> E_{\text{SPHERE}} \\ R_D &> 4\kappa_b / \lambda \end{aligned} \quad (1)$$

MODEL FOR MEMBRANE BENDING AT A HOLE

$$\lambda = \kappa_b / 2d \quad (2)$$

(1) + (2) GIVES

$$R_D > (8/) d$$

THUS, CLOSED SHELLS ARE PREFERRED OVER FREE BOUNDARIES FOR $R_{\text{DISK}} > 10 \text{ nm}$