Positional information readout in Ca^{2+} signaling

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Living cells respond to spatial signals. Signal transmission to the cell interior often involves the release of second messengers like Ca^{2+} . They will eventually trigger a physiological response by activating kinases that in turn activate target proteins through phosphorylation. Here, we investigate theoretically how positional information can be accurately read out by protein phosphorylation in spite of rapid second messenger diusion. We nd that accuracy is increased by binding of the kinases to the cell membrane prior to phosphorylation and by increasing the rate of Ca^{2+} loss from the cell interior. These ndings could explain some salient features of conventional protein kinases C.