Compartmental modelling (experimental)

Import	
`from brian.experimental.morphology import *`	
Morphology	

With geometrical primitives	`morpho=Soma(30*um) # sphere`
	`morpho.axon=Cylinder(diameter=1*um,length=50*um,n=100)`
	`morpho.dendrite = Cylinder(length=3*um, diameter=1*um,n=10)`
	`morpho.dendrite.L = Cylinder(length=5*um, diameter=1*um, n=10)`
	`morpho.dendrite.R = Cylinder(length=7*um, diameter=1*um, n=10)`
	`morpho.dendrite.LL = Cylinder(length=3*um, diameter=1*um, n=10)`

Explicit construction	`morpho.axon = Morphology(n=5)`
	`morpho.axon.diameter = ones(5)*1*um`
	`morpho.axon.length = [1*um, 2*um, 1*um, 3*um, 1*um]`
	`morpho.axon.set_coordinates()`
	`morpho.axon.set_area()`

From file	`morpho=Morphology('coordinates.swc')`
3D plot	`morpho.plot()`
Model	

	`eqs='''`
	`Im=gL*(EL-v)+I+gNa*m*(ENa-v) : amp/cm**2 # membrane equation`
	`dm/dt=(minf-m)/(0.2*ms) : 1  # simplified Na channel`
	`minf=1/(1+exp((va-v)/ka)) : 1`
	`I : amp/cm**2`
	`gNa : siemens/cm**2'''`
	`neuron=SpatialNeuron(morphology=morpho,model=eqs,Cm=1*uF/cm**2,`
	`Ri=150 * ohm * cm)`

Spike detection	`neuron=SpatialNeuron(morphology=morpho,`
	`threshold="axon[50*um].v>0*mV", model=eqs,`
	`refractory=4*ms, Cm=0.9*uF/cm**2,`
	`Ri=150*ohm*cm)`

Assignment	

Distributed	`neuron.I=0*amp/cm**2`
	`neuron.axon.gNa[20:]=100*gL`
	`neuron.axon[0*um:50*um].gNa = 1e-3*siemens/cm**2`

Point current	`neuron.I[0]=0.05*nA/neuron.area[0]`
Monitoring	
	`mon_v=StateMonitor(neuron,'v',record=True) # all compartments` `mon_v=StateMonitor(neuron,'v',record=0) # soma`