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**Algorithm 1** Calculating expected average activity

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```
1: function CALCULATE_EXPECTED_AVERAGE( $A, B, u(t)$ )
2:    $t \leftarrow 0$ 
3:   repeat
4:      $t \leftarrow t + t_{step}$ 
5:      $X(t) \leftarrow A * X + B * u(t)$ 
6:   until  $\sum_j X_j(t) = 0$  or  $t = t_{max}$ 
7: end function
```

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**Algorithm 2** Calculating empirical average activity

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```
1: function CALCULATE_EMPIRICAL_AVERAGE( $A, B, u(t)$ )
2:   for trials  $k \leftarrow 1, k_{max}$  do
3:      $s_{avg}(k) \leftarrow trigger\_avalanche(A, B, u(t))$ 
4:   end for
5:   return  $\frac{1}{k} \sum_k s_{avg}(k)$ 
6: end function
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**Algorithm 3** Generating spikes

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```
1: function TRIGGER_AVALANCHE( $A, B, u(t)$ )
2:    $t \leftarrow 0$ 
3:   repeat
4:      $t \leftarrow t + t_{step}$ 
5:     for all neurons  $j$  do
6:        $s_j(t) \leftarrow \sum_{u_j(t-1)} R(B_j) + \sum_{i \rightarrow j} \sum_{s_i(t-1)} R(A_{ij})$ 
7:     end for
8:   until  $\sum_j s_j(t) = 0$  or  $t = t_{max}$ 
9:   return  $s$ 
10: end function
11:  $\triangleright R(p)$  is a random, Bernoulli process with probability  $p$ 
12:  $\triangleright i \rightarrow j$  indicates neurons  $i$  that synapse to  $j$ 
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