```
(***Input identifying information***)

date = ToString[Evaluate[Input["Input the date of the experiment"]]]

mouse = ToString[Evaluate[Input["Input the mouse identity (e.g. Mouse123)"]]]

sessionNum = Evaluate[Input["Input the session number"]]

(***Import the frame times for the 2P images and calculate the frame rate***)

tpFrameTimes =
  Drop[Drop[(Import[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/",
       mouse, "/Session", ToString[sessionNum], "/", date, "_", mouse, "_",
       "Session", ToString[sessionNum], "_2PFrameTimes.txt"], "List"]), 16], -1];

numMovies =
  Length[FileNames["*", File[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date,
      "/", mouse, "/Session", ToString[sessionNum], "/moco/New folder/"]]]];

numFramesPerAcq = Round[Length[tpFrameTimes] / (numMovies)];

tpFrameRate = Round[Mean[numFramesPerAcq / Flatten[Differences /@
       ({First[#], Last[#]} & /@ (Partition[tpFrameTimes, numFramesPerAcq]))]]];

(****Cell bodies*****)

numROIsCBs = Length[
   FileNames["*", File[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/", mouse,
      "/Session", ToString[sessionNum], "/dFOverF0TimeSeries_CellBodies_Unfilt/"]]]];

Table[Evaluate@ToExpression[StringJoin["spikePosCB", ToString[n]]] =
    Round@Import[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/",
       mouse, "/Session", ToString[sessionNum], "/deConvdFFsCellBodies/",
       "deconvSpikecb", ToString[n], ".txt"], "List"];, {n, 1, numROIsCBs}];

Table[Evaluate@ToExpression[StringJoin["spikeTimesCB", ToString[n]]] =
    Table[tpFrameTimes[[i]],
     {i, ToExpression[StringJoin["spikePosCB", ToString[n]]]}];, {n, 1, numROIsCBs}];

(*****Axons*****)

numROIsAxons =
  Length[FileNames["*", File[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/",
      mouse, "/Session", ToString[sessionNum], "/dFOverF0TimeSeries_Axons_Unfilt/"]]]];

Table[
  Evaluate@ToExpression[StringJoin["dFFtimeseriesAxon", ToString[n]]] = ToExpression /@
     Import[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/", mouse,
       "/Session", ToString[sessionNum], "/dFoverF0TimeSeries_Axons_Unfilt/", date,
       "_", mouse, "_Session", ToString[sessionNum], "_", "dFoverF0ts_ROI",
       ToString[n], ".txt"], "List"];, {n, 1, numROIsAxons}];

Table[Evaluate@ToExpression[StringJoin["dFFtsAxon", ToString[n]]] = Partition[
    Riffle[(ToExpression[StringJoin["dFFtimeseriesAxon", ToString[n]]])[[All, 1]],
     (ToExpression[StringJoin["dFFtimeseriesAxon", ToString[n]]])[[All, 2]]],
    2];, {n, 1, numROIsAxons}];
```

```
In[•]:= Table[Evaluate@ToExpression[StringJoin["dFFIntAxon", ToString[n]]] = Interpolation[
          ToExpression[StringJoin["dFFtsAxon", ToString[n]]]];, {n, 1, numROIsAxons}];

In[•]:= (***Axon firing rates***)

In[•]:= Table[Evaluate@ToExpression[StringJoin["dFFdcAxon", ToString[n]]] =
         Import[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/",
           mouse, "/Session", ToString[sessionNum], "/deConvdFFsAxons/",
           "deconvDFFaxon", ToString[n], ".txt"], "List"];, {n, 1, numROIsAxons}];

In[•]:= Table[Evaluate@ToExpression[StringJoin["spikePosAxon", ToString[n]]] =
         Round@Import[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date,
            "/", mouse, "/Session", ToString[sessionNum], "/deConvdFFsAxons/",
            "deconvSpikeaxon", ToString[n], ".txt"], "List"];, {n, 1, numROIsAxons}];

In[•]:= Table[Evaluate@ToExpression[StringJoin["spikeTimesAxon", ToString[n]]] =
         Table[tpFrameTimes[[i]],
          {i, ToExpression[StringJoin["spikePosAxon", ToString[n]]]}];, {n, 1, numROIsAxons}];

In[•]:= w = 0.1;(***100 ms sliding window***)

In[•]:= Table[Evaluate@ToExpression[StringJoin["firingRateAxon", ToString[n]]] =
         Table[Sum[(1 / Sqrt[2 * Pi] * w) * Exp[-((t - i) ^ 2) / (2 * w^2)],
           {i, ToExpression[StringJoin["spikeTimesAxon", ToString[n]]]}],
          {t, tpFrameTimes}];, {n, 1, numROIsAxons}];

In[•]:= Table[Evaluate@ToExpression[StringJoin["dFFRtsAxon", ToString[n]]] = Partition[
          Riffle[tpFrameTimes, ToExpression[StringJoin["firingRateAxon", ToString[n]]]],
          2];, {n, 1, numROIsAxons}];

In[•]:= Table[Evaluate@ToExpression[StringJoin["dFFRIntAxon", ToString[n]]] = Interpolation[
          ToExpression[StringJoin["dFFRtsAxon", ToString[n]]]];, {n, 1, numROIsAxons}];

In[•]:= (*******************************************************)

In[•]:= (*******Import quiescent (non-locomotion) periods**********)

In[•]:= quiescentPeriods =
          ToExpression[Import[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/",
             mouse, "/Session", ToString[sessionNum], "/LocomotionData/", date, "_", mouse,
             "_", "Session", ToString[sessionNum], "_QuiescentBouts.txt"], "List"]];

        (***Truncate quiescent periods so that the
         analysis won't include any locomotion onsets or offsets ***)

In[•]:= quiescentPeriodsTrunc = Table[{quiescentPeriods[[n, 1]] + 8, quiescentPeriods[[n, 2]] - 8},
           {n, 1, Length[quiescentPeriods]}];

In[•]:= (***Only keep quiescent periods at least 9 s long***)

In[•]:= quiescentPeriodsLongBef =
          DeleteCases[Table[If[quiescentPeriodsTrunc[[n, 2]] - quiescentPeriodsTrunc[[n, 1]] ≥ 9,
             quiescentPeriodsTrunc[[n]], Null], {n, 1, Length[quiescentPeriodsTrunc]}], Null];

In[•]:= (***For each acquisition bout, determine the quiescent periods
         contained within it and then make sure they're at least 9 s long***)
```

```
In[•]:= acqBoutIntervals =
          Interval /@ ({First[#] + 4, Last[#] - 4} & /@ (Partition[tpFrameTimes, numFramesPerAcq]));

In[•]:= testedIntervals = Table[MinMax /@ (IntervalIntersection[acqBoutIntervals[[n]], #] & /@
              (Interval /@ quiescentPeriodsLongBef)), {n, 1, Length[acqBoutIntervals]}];

In[•]:= acceptedQuiescentPeriods = Flatten[
           Table[DeleteCases[Table[If[NumberQ@(Differences[testedIntervals[[m, n]]][[1]]),
                 testedIntervals[[m, n]], Null], {n, 1, Length[testedIntervals[[m]]]}],
             Null], {m, 1, Length[testedIntervals]}], 1];

In[•]:= quiescentPeriodsLong = DeleteCases[
           Table[If[acceptedQuiescentPeriods[[n, 2]] - acceptedQuiescentPeriods[[n, 1]] ≥ 9,
             acceptedQuiescentPeriods[[n]], Null],
            {n, 1, Length[acceptedQuiescentPeriods]}], Null];

In[•]:= Table[
          Evaluate@ToExpression[StringJoin["acceptedSpikeTimesCB", ToString[cb]]] = DeleteCases[
             Table[If[Length[Cases[IntervalMemberQ[#, (ToExpression[StringJoin["spikeTimesCB",
                         ToString[cb]]])[[n]]] & /@ (Interval /@ quiescentPeriodsLong), True]] >
                0, (ToExpression[StringJoin["spikeTimesCB", ToString[cb]]])[[n]], Null],
              {n, 1, Length[(ToExpression[StringJoin["spikeTimesCB", ToString[cb]]])]}],
             Null];, {cb, 1, numROIsCBs}];

        (******Calculate cell body spike-triggered average axon dF/F,
        4s before and 4s after each spike***********)

In[•]:= Table[
          Evaluate@ToExpression[StringJoin["staDFFCB", ToString[cb], "Axon", ToString[axon]]] =
            Mean[Table[Table[(ToExpression[StringJoin["dFFIntAxon", ToString[axon]]])[t],
                {t, (ToExpression[StringJoin["acceptedSpikeTimesCB", ToString[cb]]])[[n]] - 4,
                 (ToExpression[StringJoin["acceptedSpikeTimesCB", ToString[cb]]])[[n]] + 4,
                 N@1 / tpFrameRate}], {n, 1,
                Length[(ToExpression[StringJoin["acceptedSpikeTimesCB", ToString[cb]]])]}]];,
          {cb, 1, numROIsCBs}, {axon, 1, numROIsAxons}];

In[•]:= Table[Evaluate@ToExpression[StringJoin["staFRCB", ToString[cb], "Axon", ToString[axon]]] =
            Mean[Table[Table[(ToExpression[StringJoin["dFFRIntAxon", ToString[axon]]])[t],
                {t, (ToExpression[StringJoin["acceptedSpikeTimesCB", ToString[cb]]])[[n]] - 4,
                 (ToExpression[StringJoin["acceptedSpikeTimesCB", ToString[cb]]])[[n]] + 4,
                 N@1 / tpFrameRate}], {n, 1,
                Length[(ToExpression[StringJoin["acceptedSpikeTimesCB", ToString[cb]]])]}]];,
          {cb, 1, numROIsCBs}, {axon, 1, numROIsAxons}];

In[•]:= Table[Evaluate@ToExpression[StringJoin["overallDFFsta", ToString[cb]]] = Mean[
             Table[ToExpression[StringJoin["staDFFCB", ToString[cb], "Axon", ToString[axon]]],
              {axon, 1, numROIsAxons}]];, {cb, 1, numROIsCBs}];

In[•]:= Table[Evaluate@ToExpression[StringJoin["overallFRsta", ToString[cb]]] =
            Mean[Table[ToExpression[StringJoin["staFRCB", ToString[cb], "Axon", ToString[axon]]],
              {axon, 1, numROIsAxons}]];, {cb, 1, numROIsCBs}];
```

```
(**********Create random cb spike trains to calculate chance-
 level sta***************)

(***Empirical ISI distribution***)

Table[Evaluate@ToExpression[StringJoin["isiDistCB", ToString[cb]]] =
    EmpiricalDistribution[Flatten[Differences /@ Table[
        DeleteCases[Table[If[IntervalMemberQ[Interval@quiescentPeriodsLong[[bout]],
            (ToExpression[StringJoin["spikeTimesCB", ToString[cb]]])[[n]]],
           (ToExpression[StringJoin["spikeTimesCB", ToString[cb]]])[[n]], Null],
          {n, 1, Length[(ToExpression[StringJoin["spikeTimesCB", ToString[cb]]])]}],
         Null], {bout, 1, Length[quiescentPeriodsLong]}]]];, {cb, 1, numROIsCBs}];

(***Random ISIs drawn from empirical distributions***)

Table[Evaluate@ToExpression[StringJoin["randISIs", ToString[cb]]] = RandomVariate[
     ToExpression[StringJoin["isiDistCB", ToString[cb]]], Length[ToExpression[
       StringJoin["acceptedSpikeTimesCB", ToString[cb]]]]];, {cb, 1, numROIsCBs}];

(***Random spike times for each CB***)

Table[Evaluate@ToExpression[StringJoin["randSpikeTimesCB", ToString[cb]]] =
    Flatten[Table[DeleteCases[Accumulate[Prepend[RandomSample@(ToExpression[
            StringJoin["randISIs", ToString[cb]]]), quiescentPeriodsLong[[bout, 1]] +
          (RandomSample@(ToExpression[StringJoin["randISIs", ToString[cb]]]))[[1]]]],
       _?(# > quiescentPeriodsLong[[bout, 2]] &)], {bout, 1,
       Length[quiescentPeriodsLong]}]];, {cb, 1, numROIsCBs}];

(******For chance-
 level simulation: Calculate cell body spike-triggered average axon dF/F,
4s before and 4s after each spike***********)

Table[
  Evaluate@ToExpression[StringJoin["staRandCB", ToString[cb], "Axon", ToString[axon]]] =
    Mean[Table[Table[(ToExpression[StringJoin["dFFIntAxon", ToString[axon]]])[t],
       {t, (ToExpression[StringJoin["randSpikeTimesCB", ToString[cb]]])[[n]] - 4,
        (ToExpression[StringJoin["randSpikeTimesCB", ToString[cb]]])[[n]] + 4,
        N@1/tpFrameRate}],
      {n, 1, Length[(ToExpression[StringJoin["randSpikeTimesCB", ToString[cb]]])]}]];,
  {cb, 1, numROIsCBs}, {axon, 1, numROIsAxons}];

Table[
  Evaluate@ToExpression[StringJoin["staRandFRCB", ToString[cb], "Axon", ToString[axon]]] =
    Mean[Table[Table[(ToExpression[StringJoin["dFFRIntAxon", ToString[axon]]])[t],
       {t, (ToExpression[StringJoin["randSpikeTimesCB", ToString[cb]]])[[n]] - 4,
        (ToExpression[StringJoin["randSpikeTimesCB", ToString[cb]]])[[n]] + 4,
        N@1/tpFrameRate}],
      {n, 1, Length[(ToExpression[StringJoin["randSpikeTimesCB", ToString[cb]]])]}]];,
  {cb, 1, numROIsCBs}, {axon, 1, numROIsAxons}];
```

```
In[•]:= Table[Evaluate@ToExpression[StringJoin["overallDFFstaRand", ToString[cb]]] = Mean[
          Table[ToExpression[StringJoin["staRandCB", ToString[cb], "Axon", ToString[axon]]],
           {axon, 1, numROIsAxons}]];, {cb, 1, numROIsCBs}];

In[•]:= Table[Evaluate@ToExpression[StringJoin["overallFRstaRand", ToString[cb]]] = Mean[
          Table[ToExpression[StringJoin["staRandFRCB", ToString[cb], "Axon", ToString[axon]]],
           {axon, 1, numROIsAxons}]];, {cb, 1, numROIsCBs}];

In[•]:= (***********************************************)

     (***Visualize event-triggered average for each cell body***)

In[•]:= Manipulate[{ListLinePlot[{ToExpression[StringJoin["overallFRsta", ToString[cb]]],
         ToExpression[StringJoin["overallFRstaRand", ToString[cb]]]}],
       ListLinePlot[{ToExpression[StringJoin["overallDFFsta", ToString[cb]]], ToExpression[
          StringJoin["overallDFFstaRand", ToString[cb]]]}]}, {cb, 1, numROIsCBs, 1}]

In[•]:= (***********Export data*************************************)

In[•]:= CreateDirectory[
       StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/", mouse, "/Session",
        ToString[sessionNum], "/", "PMSpikeTriggeredAvgAxonActivity_FRestimates/"]];

In[•]:= Table[Export[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/", mouse, "/Session",
         ToString[sessionNum], "/", "PMSpikeTriggeredAvgAxonActivity_FRestimates/",
         "overallFRsta", ToString[cb], ".txt"],
        ToExpression[StringJoin["overallFRsta", ToString[cb]]]], {cb, 1, numROIsCBs}];

In[•]:= Table[Export[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/", mouse, "/Session",
         ToString[sessionNum], "/", "PMSpikeTriggeredAvgAxonActivity_FRestimates/",
         "overallFRstaRand", ToString[cb], ".txt"],
        ToExpression[StringJoin["overallFRstaRand", ToString[cb]]]], {cb, 1, numROIsCBs}];

In[•]:= Table[Export[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/", mouse, "/Session",
         ToString[sessionNum], "/", "PMSpikeTriggeredAvgAxonActivity_FRestimates/",
         "overallDFFsta", ToString[cb], ".txt"],
        ToExpression[StringJoin["overallDFFsta", ToString[cb]]]], {cb, 1, numROIsCBs}];

In[•]:= Table[Export[StringJoin["S:/Imaging/Garrett/FMB208_2PRig/", date, "/", mouse, "/Session",
         ToString[sessionNum], "/", "PMSpikeTriggeredAvgAxonActivity_FRestimates/",
         "overallDFFstaRand", ToString[cb], ".txt"],
        ToExpression[StringJoin["overallDFFstaRand", ToString[cb]]]], {cb, 1, numROIsCBs}];
```