PI_ICR_simulated_data Documentation

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Overview

- Language: MATLAB
- PI_ICR_simulated_data.m creates simulated data files based on user-input cyclotron frequencies and accumulation times
- Input: Various User Inputs (detailed later)
- Output:
 - .csv files containing simulated position, time-of-flight and (fake) TDC trigger information
 - One .csv file containing an address list of files, their accumulations times (Taccs) and reference files assignments

User Inputs

```
tacc_list = [.6000002,.6000141,.600030,.6000479,.6000658,.6001155,.6001513,.6001702,.600203]; % List of Accumulation Times

new_filename = '/Users/wsporter/Documents/Physics_Research/TITAN/PIICR_Analysis/Simulated_Data/56V_small_forplot/56V_sim';

spot_freq_list = [1005878.022,1005860.729,1005856.879,1005842.204,1005750.655]; % Expected w_c of spots in the trap

R = 4; % Average radius of spots

pos_deviation = 0.5; % Sigma of Gaussian distribution for X/Y positions

TOF = 0.000006; % Mean of Gaussian distribution for time-of-flight

tof_deviation = 0.000003 % Sigma of Guassian distribution for time-of-flight

counts_per_spot = 100;

w_minus = 6150;

amp = 0.01; % Amplitude of Sine Dependency

phase_const = 10; % Phase Constant of Sine Dependency

ref phase = 150; % Phase of Reference Spot
```

User Inputs

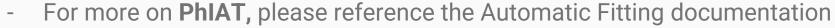
- tacc_list: A list of accumulation times you want data simulated for. One file will be made for each Tacc
- new_filename: Directory (and filename) to be used
- spot_freq_list: A list of cyclotron frequencies of spots you want in the simulated files
 - These can be taken from TITAN_spreadsheet.xlsx
- **R:** Average distance from trap center of the spots
- pos_deviation: Simulated Gaussian spread of X/Y positions
- **TOF:** Simulated ToF between ejection and detector of counts

User Inputs

- **tof_deviation:** Simulated Gaussian spread of ToFs
- counts_per_spot: Counts to be simulated for each spot (where spots are determined by cyclotron frequency list)
- w_minus: Magnetron frequency in trap
- **amp:** Amplitude of the sinusoid dependence (see Automatic Fitting for more explanation)
- **phase_const:** Phase constant of the sinusoid dependence
- **ref_phase:** Phase of the reference (i.e. Tacc = 0) spot

new_filename

- new_filename should be of the form: ~/path/to/directory/filename
 - ~/path/to/directory is the directory where files will be saved
 - filename will be the name of the FileList.csv
 - filenameTacc.csv will be the name of each simulated data file (where Tacc will be the respective Tacc number)
- NOTE: When using simulated data with PhIAT.m, make sure Sim Ion Rate is checked and the trap center is set as (0,0)
- Once user inputs are done, press the MATLAB run button to create your files!



- Please contact Sam Porter (wporter@triumf.ca) if you have any questions