Leveraging pileup as a zero bias trigger for New Physics searches

At the Large Hadron Collider, each recorded event by the ATLAS and CMS collaborations contains many nearly simultaneous pp collisions occuring at the same time as the primary interaction of interest.
These pileup collisions are usually a nuisance, degrading the energy resolution of jets and the missing transverse momentum. However, interesting process can also occur in the pileup interactions and by construction, they are selected without bias since the primary interaction was used to trigger the event. These zero bias events have a large effective pre-scale, but can be useful for searches and measurements that are difficult to record from an online trigger. As an example, the improvement in the sensitivity to low mass dijet resonances using pileup interactions can be studied.
The study would consist in using Monte Carlo generators to simulate the signal and background process, developing the signal selection and reconstruction strategy, and estimate the sensitivity enhancement in different pileup scenarios.