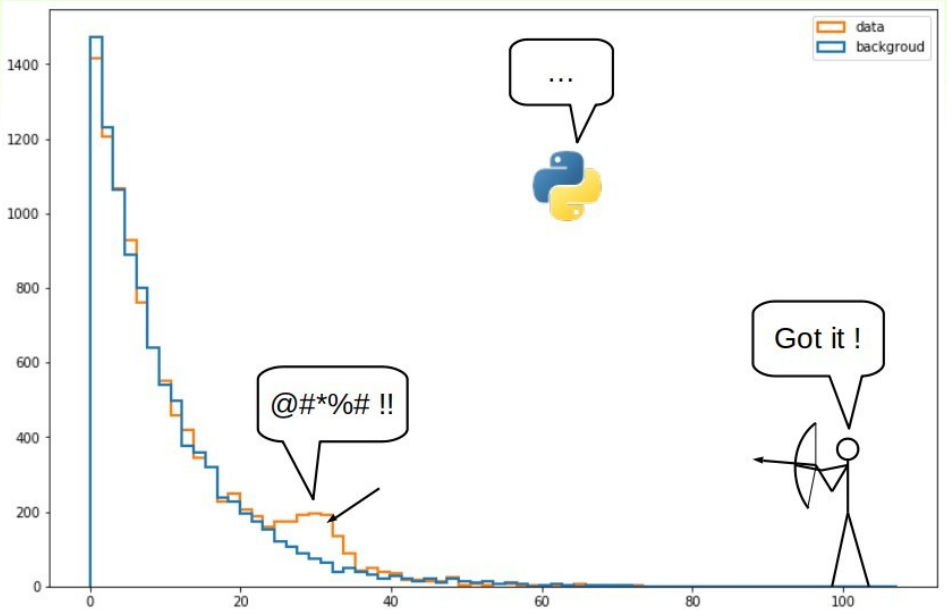
pyBumpHunter : bump hunting in python

- Context

  In most case, searches for **BSM** signatures rely on *hypothetical signal models*

  An alternative to such targeted searches is to look for a **deviation** (excess or deficit) of **data** compared to a **reference** background



- The BumpHunter algorithm

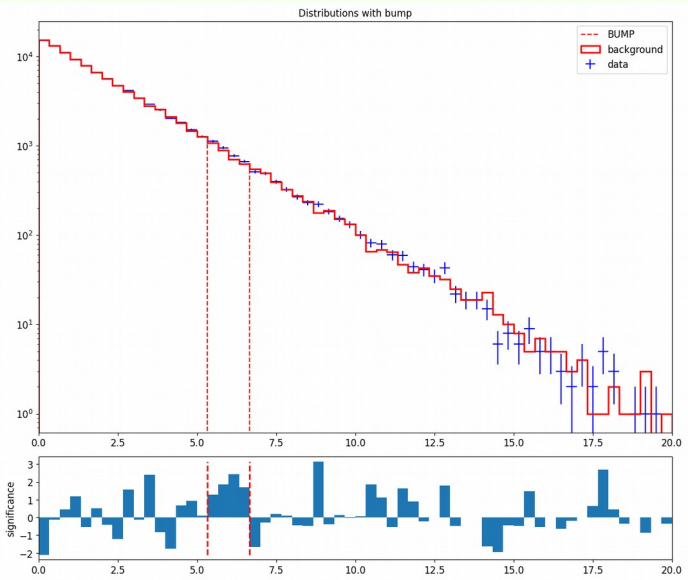
  This is a possible solution for **signal agnostic search** for new phenomenon

  A statistically robust algorithm that accounts for the look-elsewhere effect

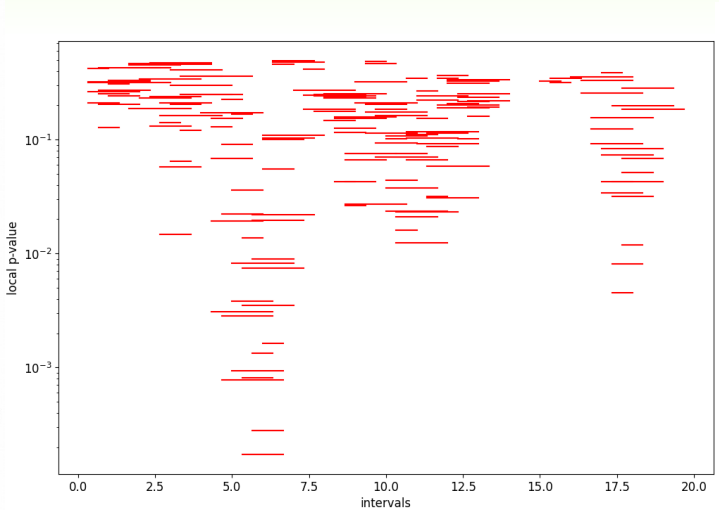
  pyBumpHunter is a new **public** and **pure python** (no ROOT) version of this algorithm

pyBumpHunter : bump hunting in python

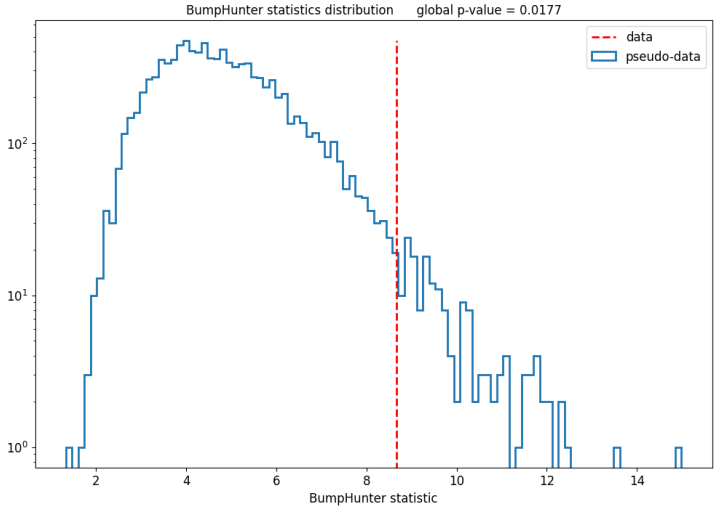
- pyBumpHunter functionalities : bump scan



Compare the data with a **reference background**



Compute the **local p-value** for different position and width



Draw toys from the background and compute a **global p-value**

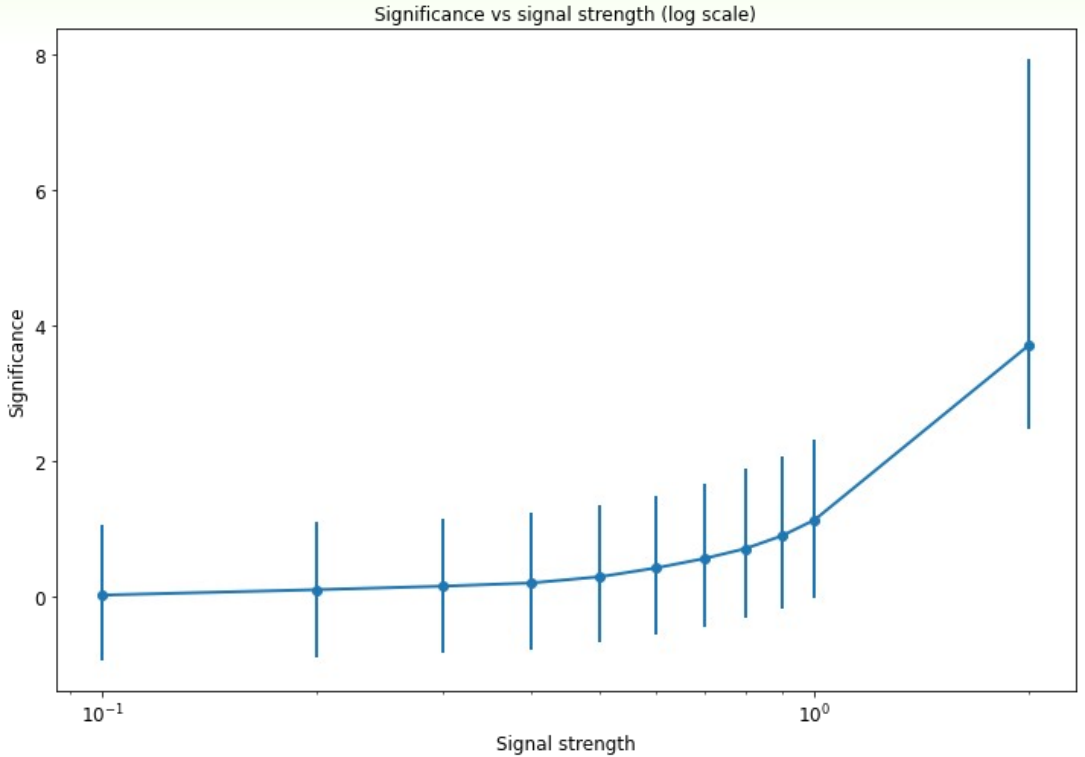
pyBumpHunter : bump hunting in python

- pyBumpHunter functionalities : signal injection

Use the BumpHunter algorithm to perform **signal injection** tests

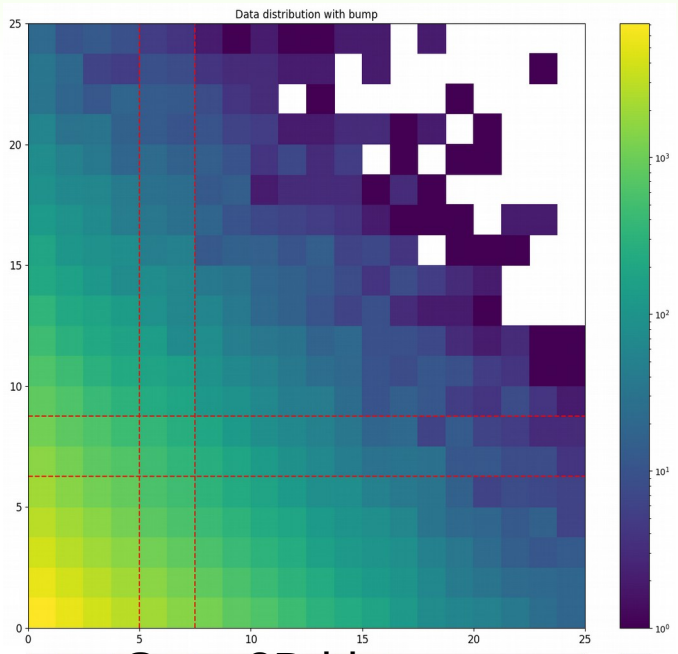
Compute signal strength based on expected number of signal event

Stop injection when the required **global significance** is reached

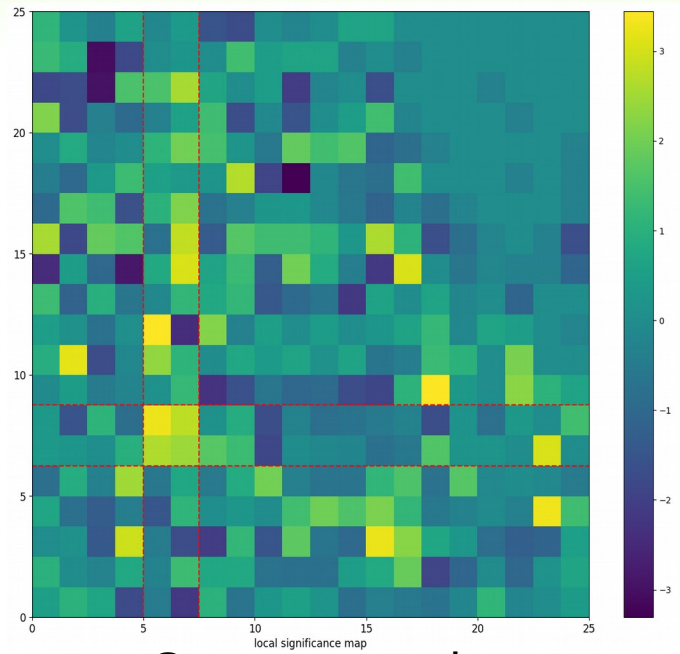


pyBumpHunter : bump hunting in python

- BumpHunter2D : Expanding the bump hunt in 2D



Scan 2D histograms



Compute p-values

First implementation of BumpHunter algorithm in 2D

2D bump scan function available in the last pyBumpHunter version

Future versions will also bring **2D signal injection**

pyBumpHunter : bump hunting in python

- How to get pyBumpHunter

  pyBumpHunter is available on **PyPI**
  https://pypi.org/project/pyBumpHunter/

  Code is available available on **github**
  https://github.com/scikit-hep/pyBumpHunter

  pyBumpHunter has been accepted as part of the scikit-HEP project

  Don’t forget :
  pyBumpHunter is still in **active development**
  More and more nice features will be added !!