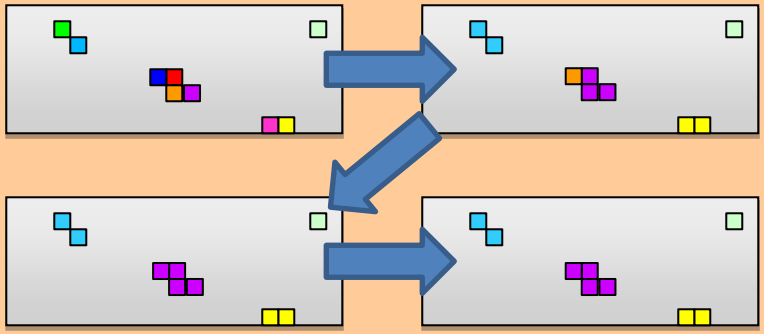
Pixel clusterization on GPU

- Two new algorithms for parallel execution:
  - for algorithm **B** fast AND operation for symmetrical Boolean matrices was developed

A. The parallel iterative algorithm :

D. Emeliyanov

The algorithm uses a cellular automaton (CA) to iteratively combine hits into groups. All hits are assigned initial tags (proposed cluster Ids) and then retagged by adjacent hits with a higher tag index until the CA stops evolving.



B. The algorithm with cluster size control:

J. Howard

Given cluster size limit L the algorithm calculates the L-th power of the hit adjacency matrix A
Element $A^L(i, j)$ gives the number of walks of length L from hit i to hit j
Basically, if $A^L(i, j) \neq 0$ the two hits belongs to the same cluster and the cluster diameter does not exceed L
Matrix multiplication can be done very efficiently on GPUs. In addition, this algorithm benefits from all the matrix products being Boolean – bit-wise AND is used instead of actual multiplication