DYNAMIC OF CONGESTION IN PEDESTRIAN TRAFFIC

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OVERVIEW

Motivation

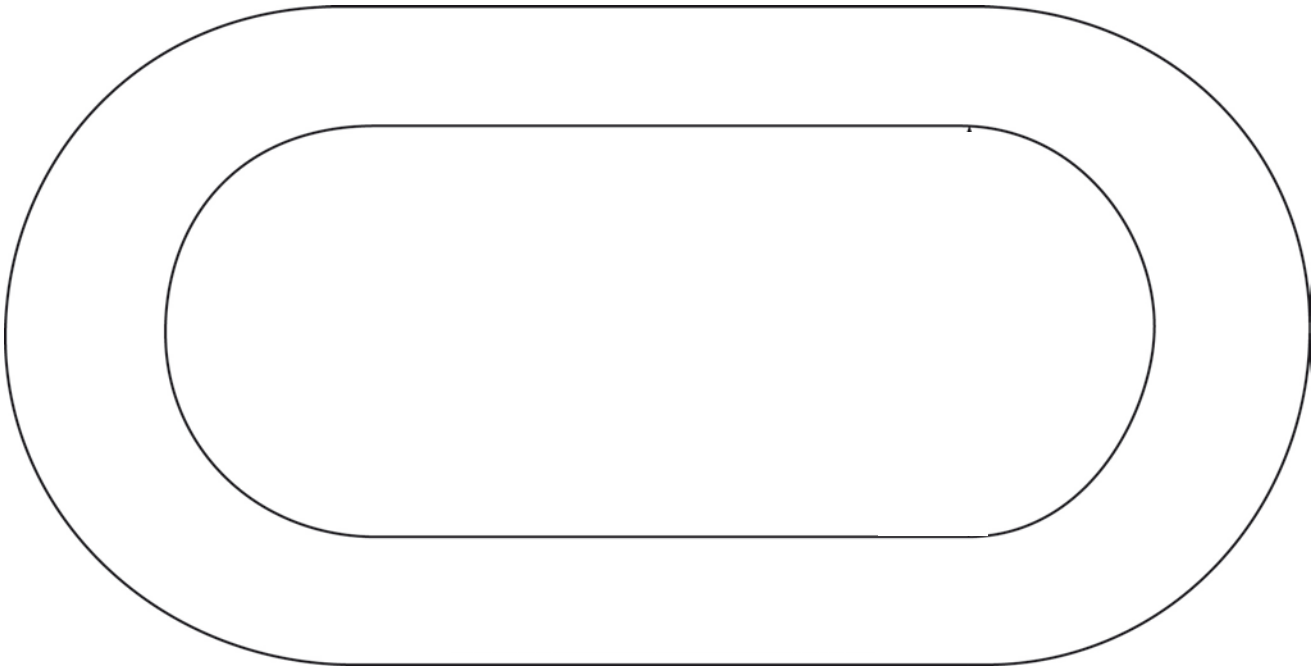
Transformation

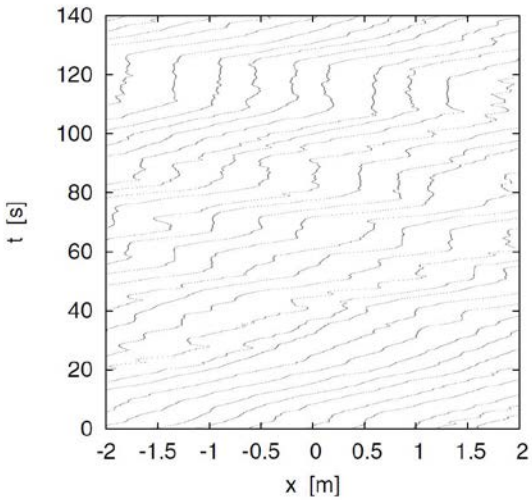
Data out of line or curve

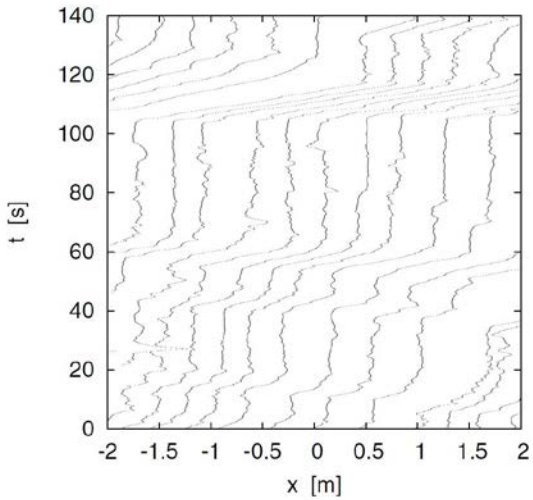
Coexcistense of two phases

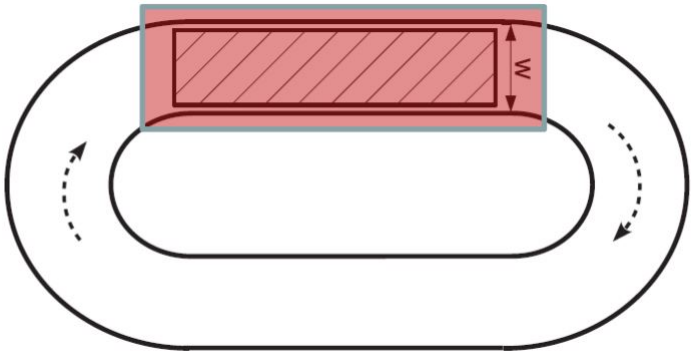
Methodology to describe congestions

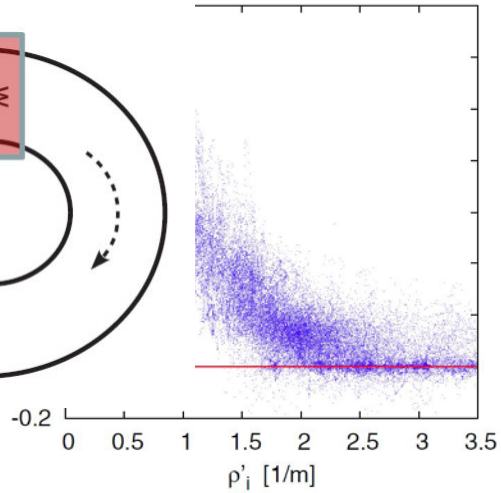
simple case: 1 dimensional system with closed boundary conditions

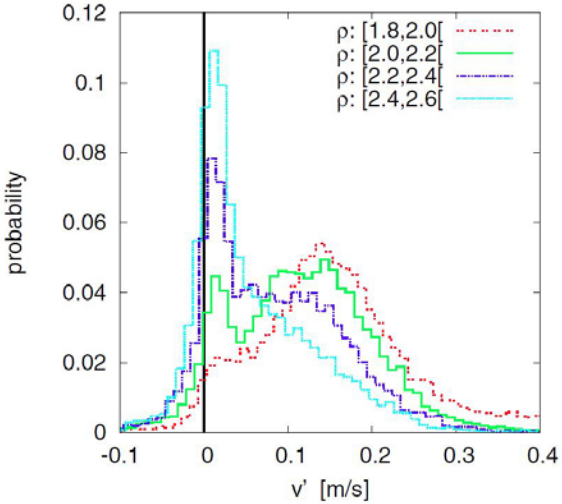




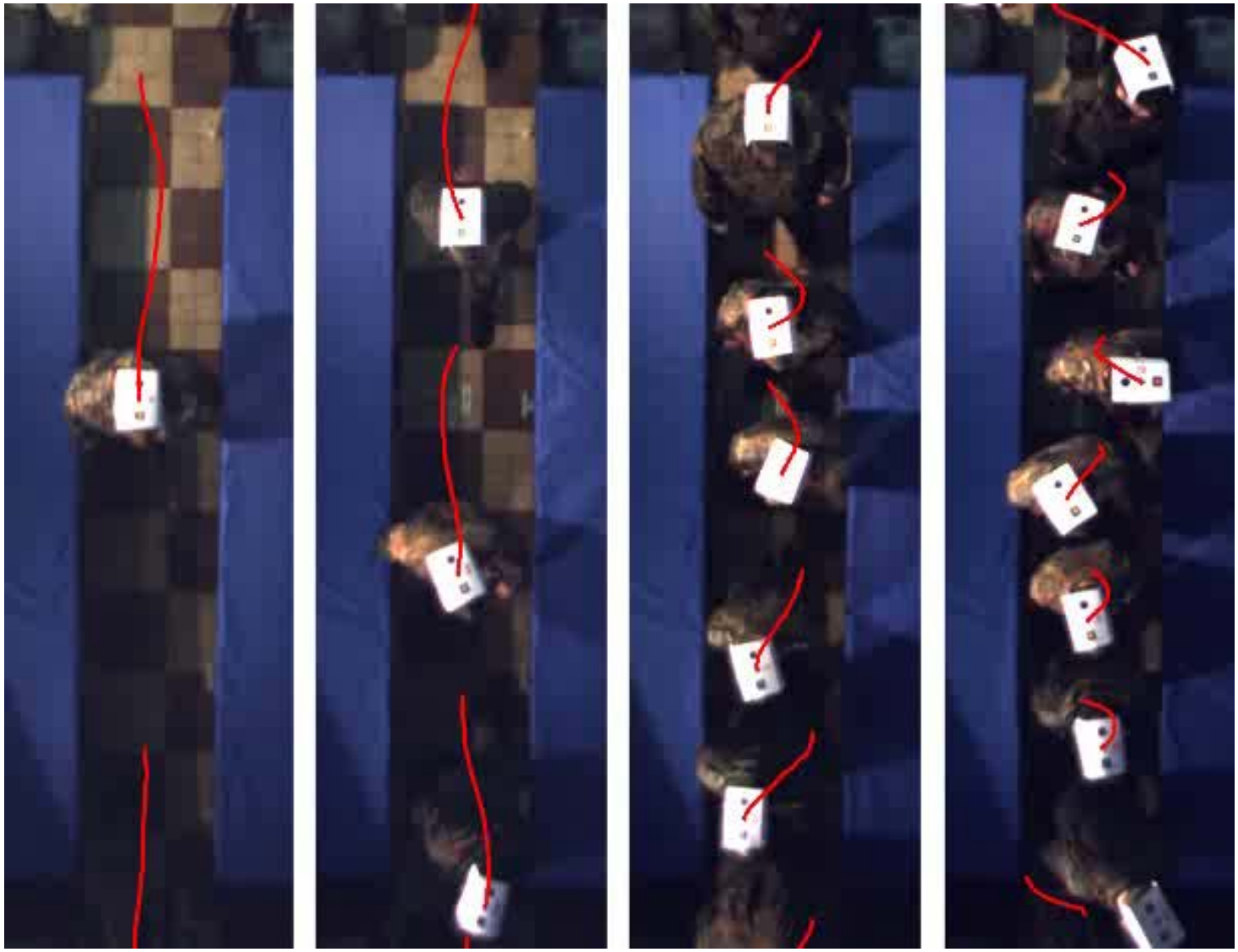








Coexistence of two states at one density, Portz et al. (2011)



14 25 39 56

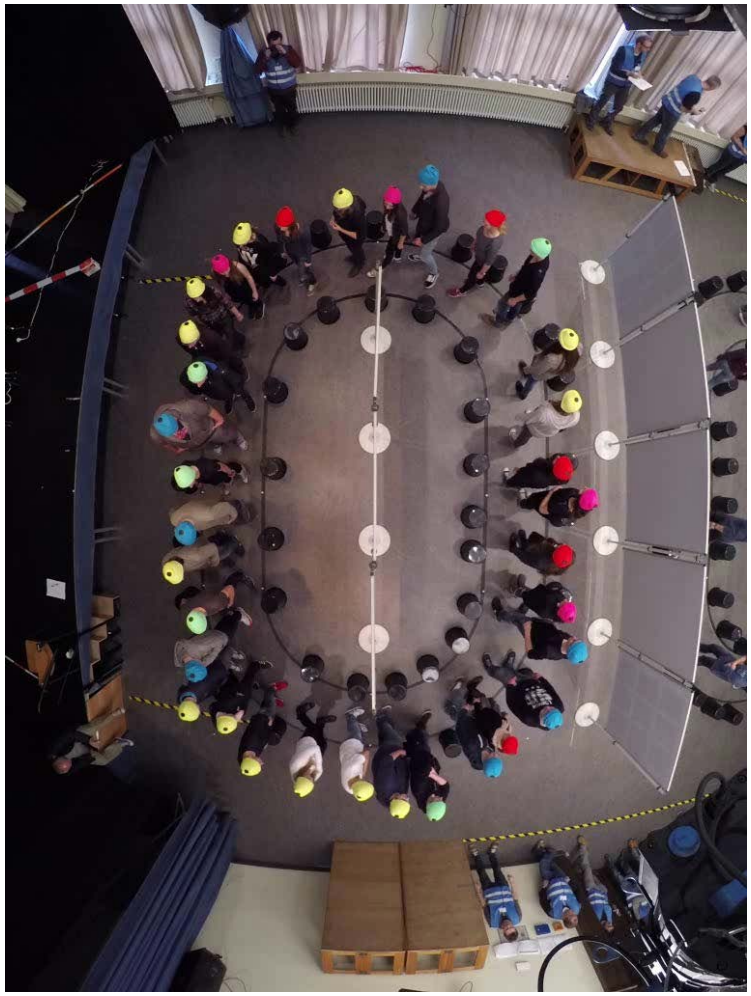
Research question:

Does the heterogeneity influences the pedestrian traffic?

Experiments at schools in 2014/15

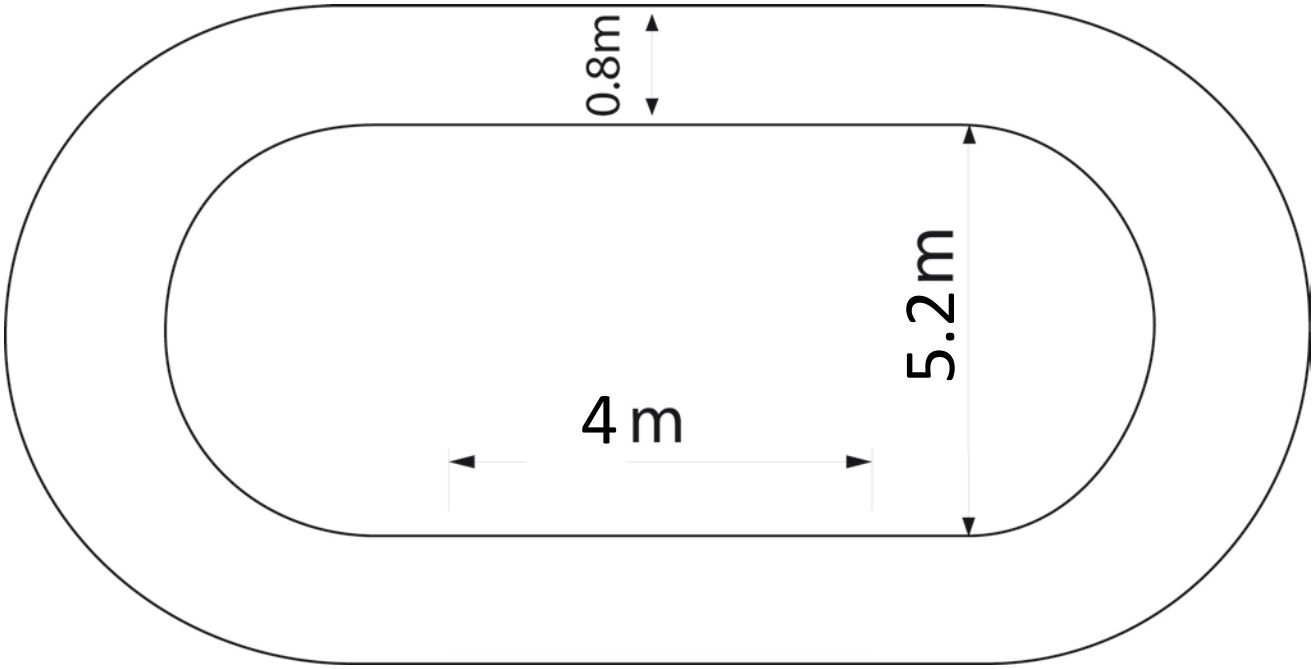
GRADE 5

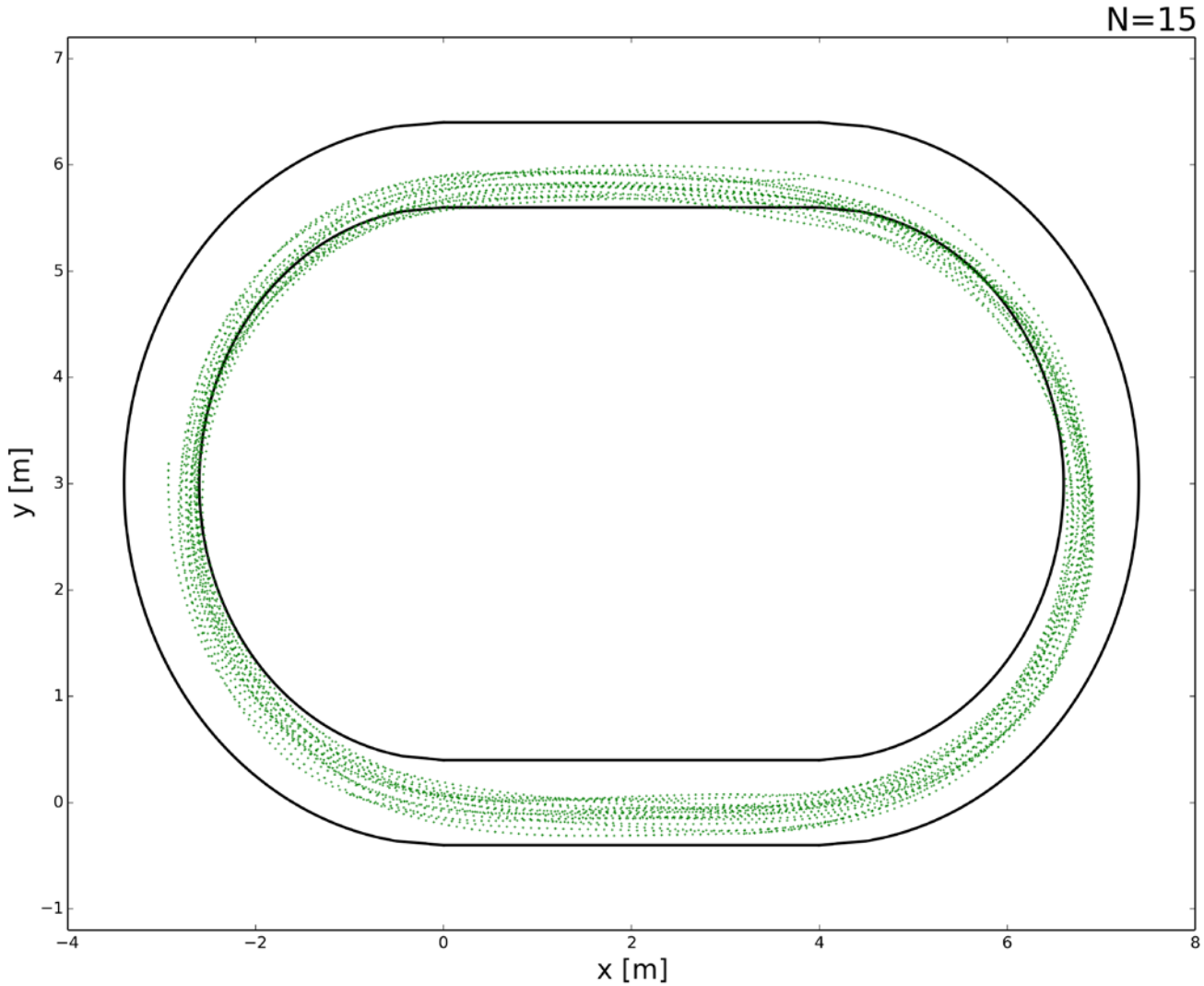
GRADE 11

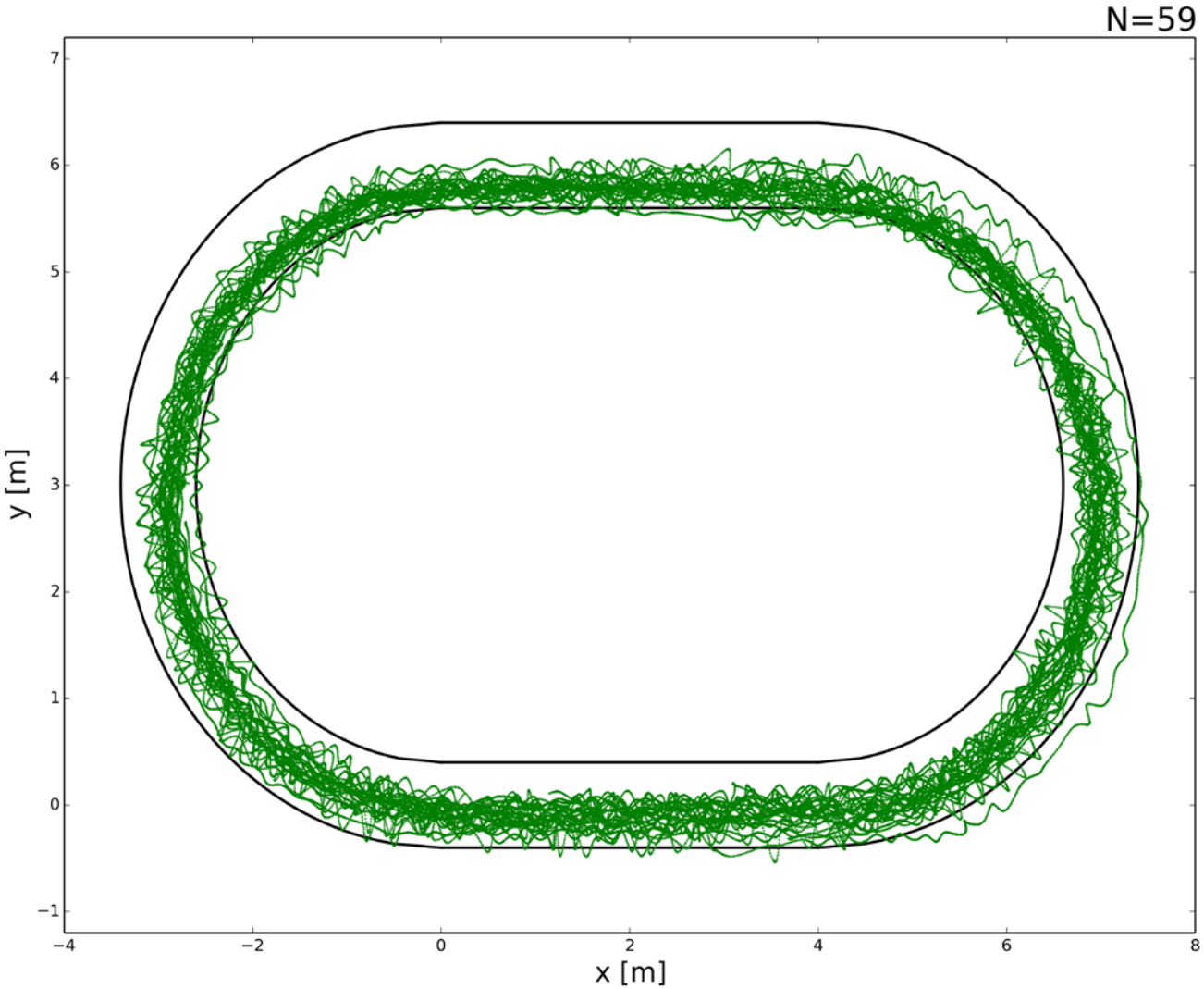


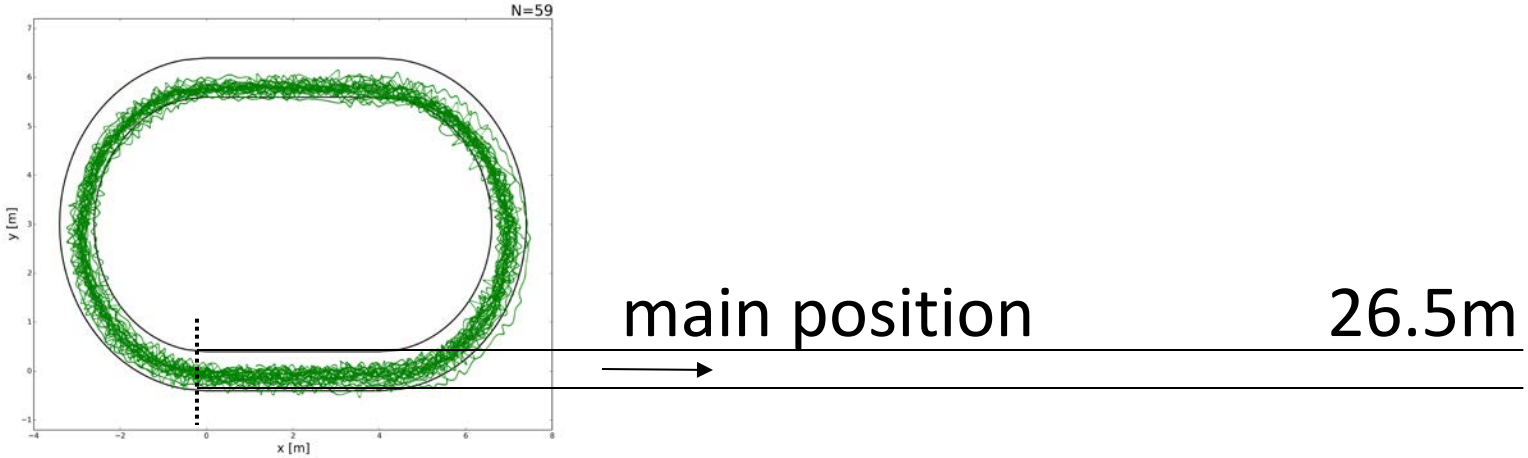
TRANSFORMATION

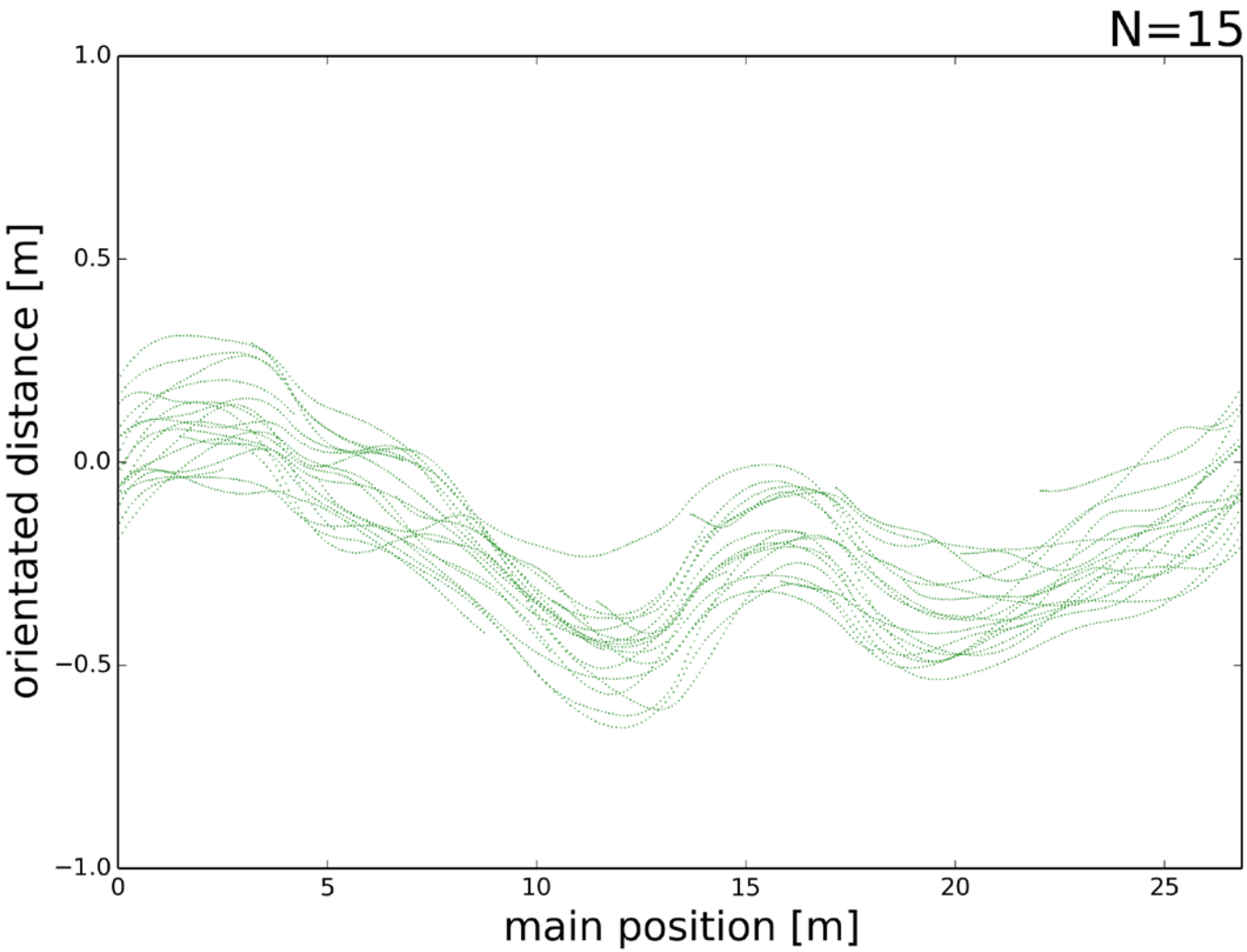
- Data: BaSiGo 2013
- N = 15, 30, 47, 55, 52, 59

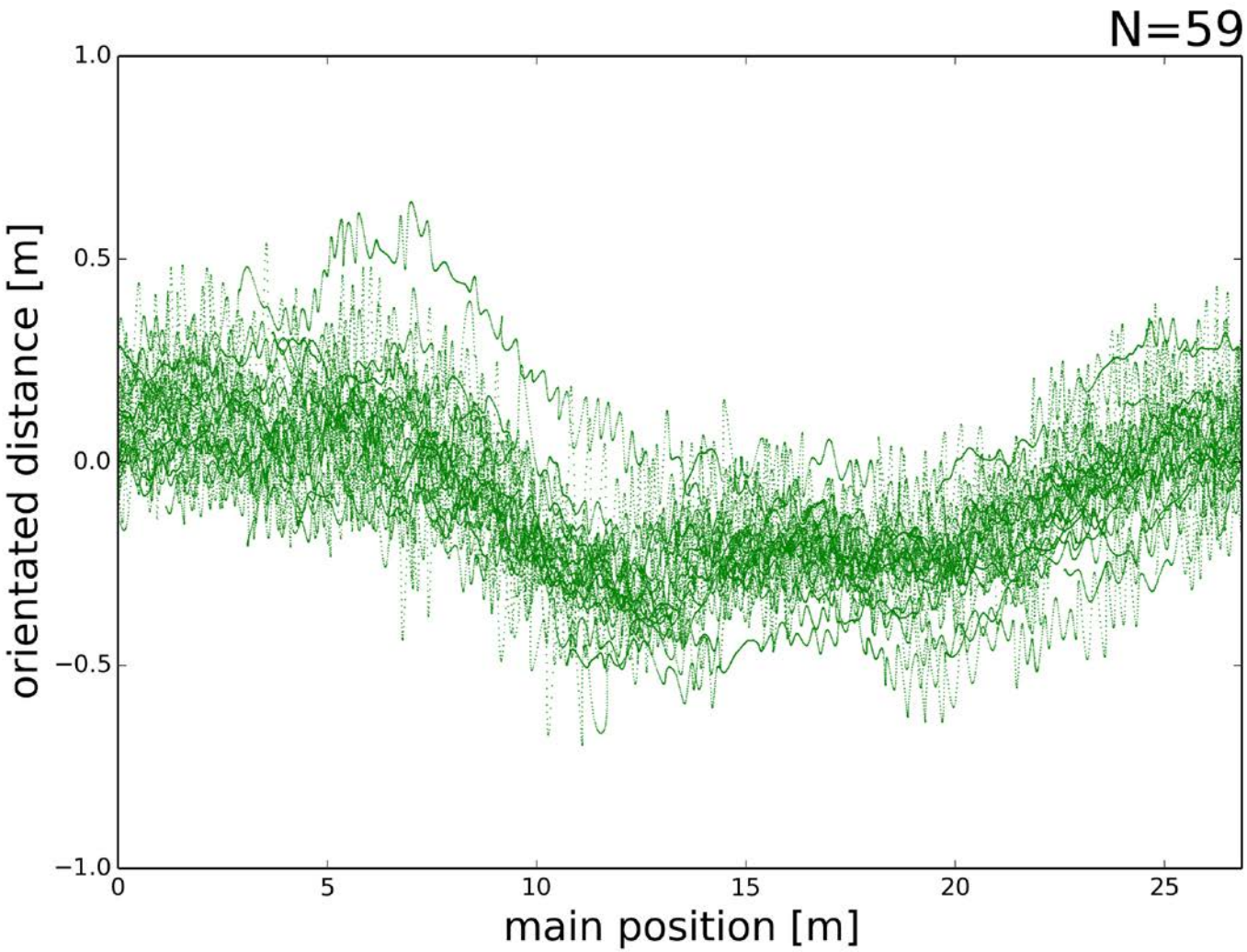



N=15
y [m]
x [m]
7
6
5
4
3
2
1
0
−1
−4
−2
0
2
4
6
8

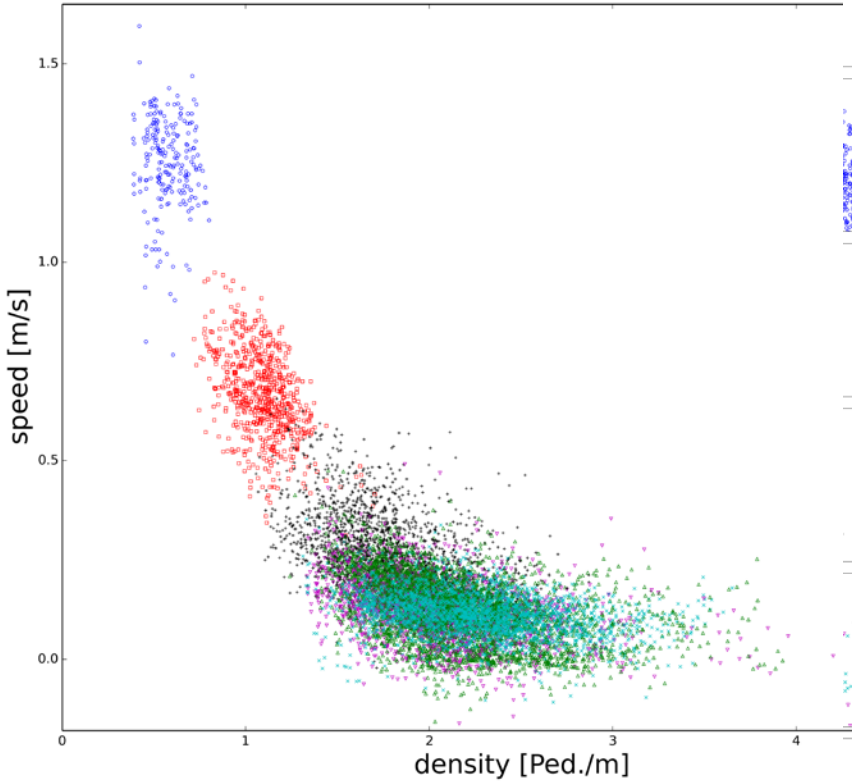

N=59
y [m]
x [m]
7
6
5
4
3
2
1
0
−1
−4
−2
0
2
4
6
8


N=59
y [m]
x [m]
main position
26.5m

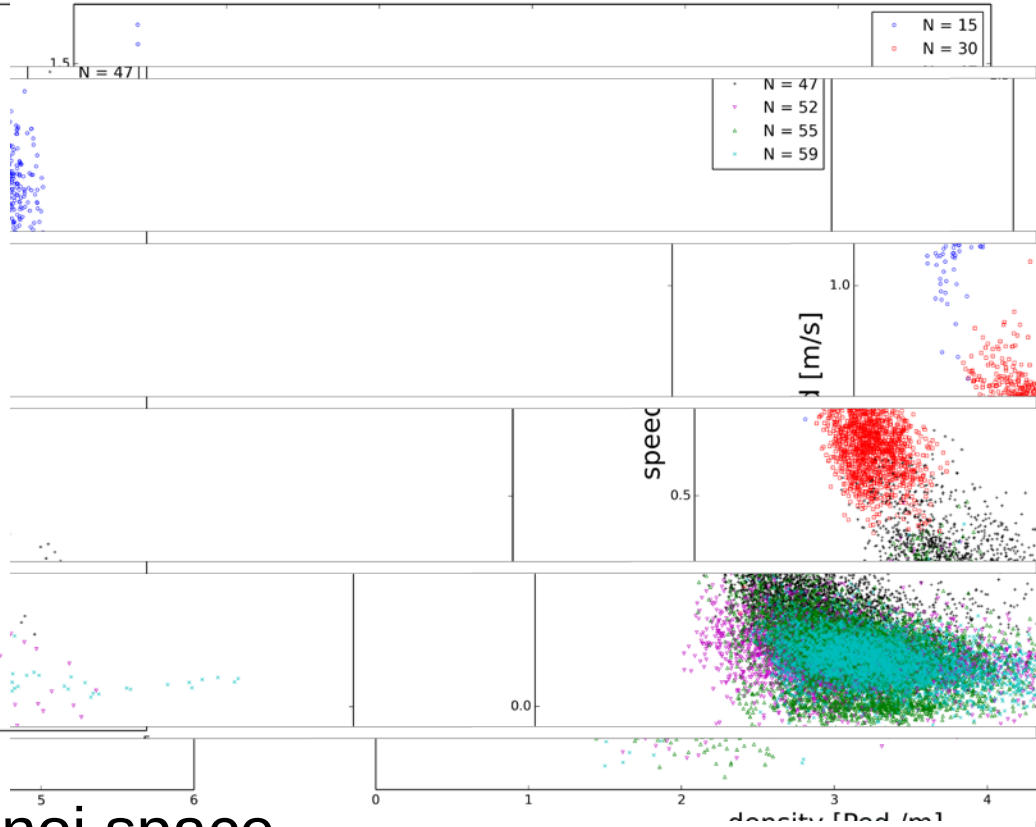

N=15
1.0
0.5
0.0
−0.5
−1.0
0
5
10
15
20
25
orientated distance [m]
main position [m]


N=59
1.0
0.5
0.0
−0.5
−1.0
0
5
10
15
20
25
orientated distance [m]
main position [m]

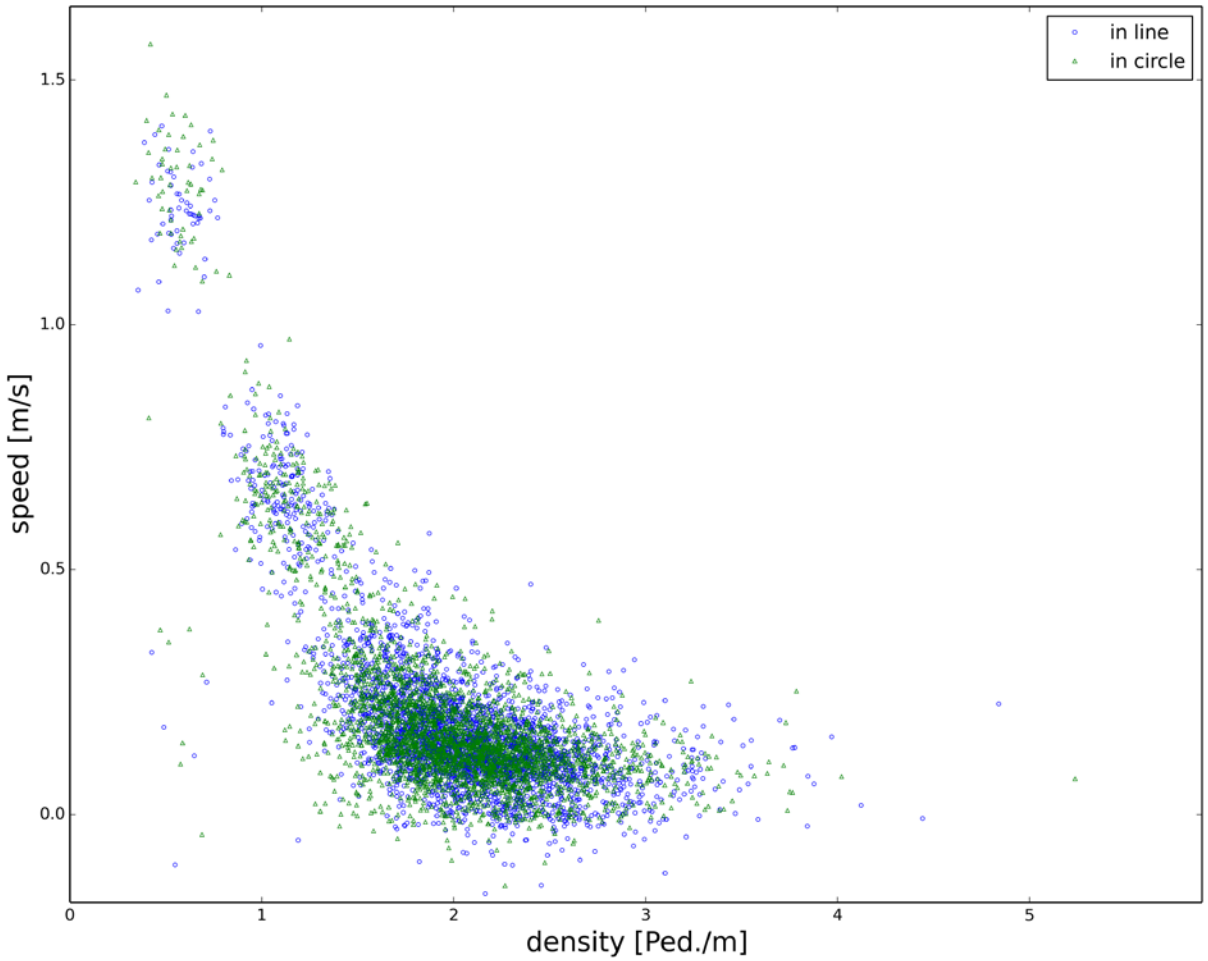
IN LINE

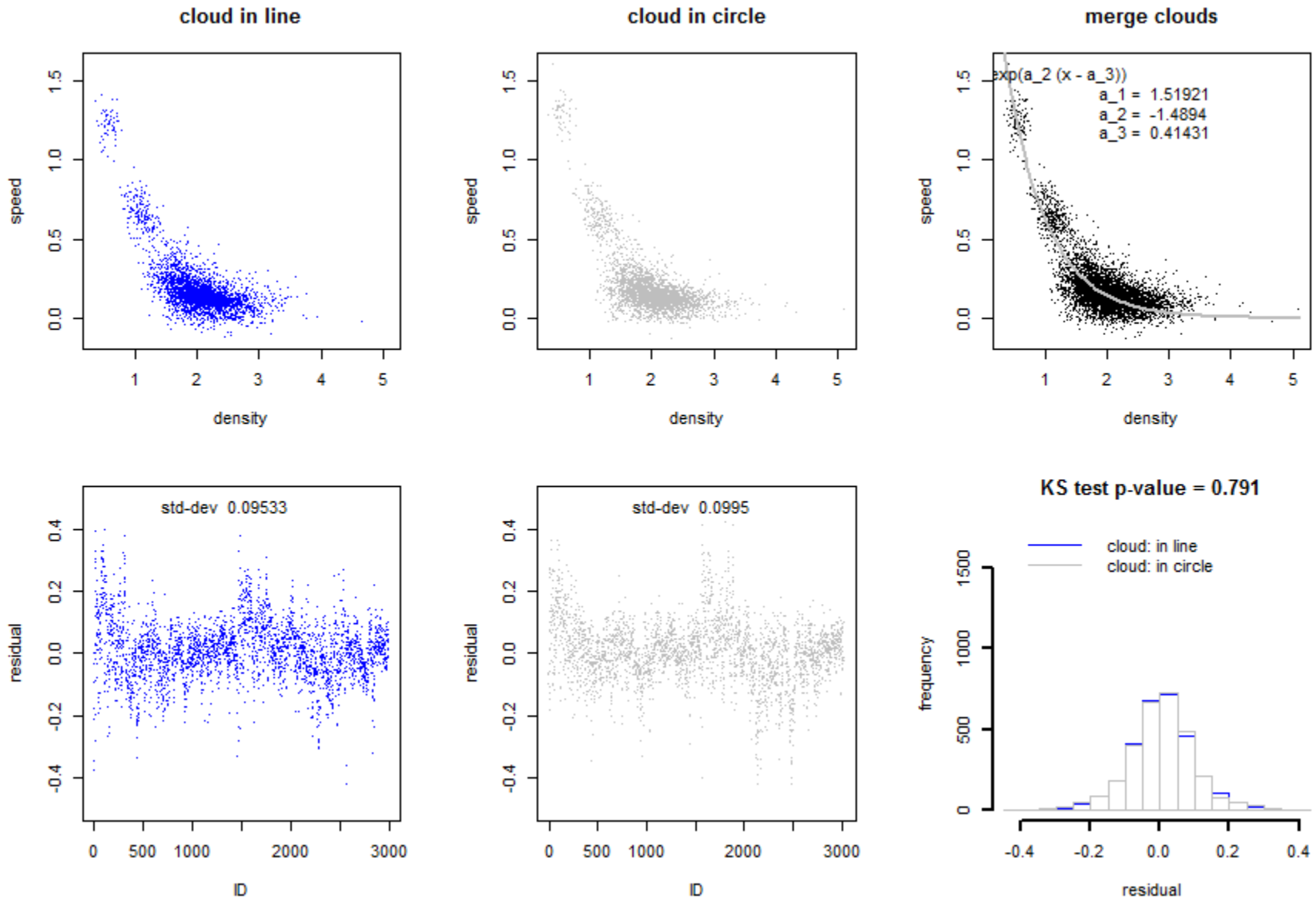


IN CIRCLE

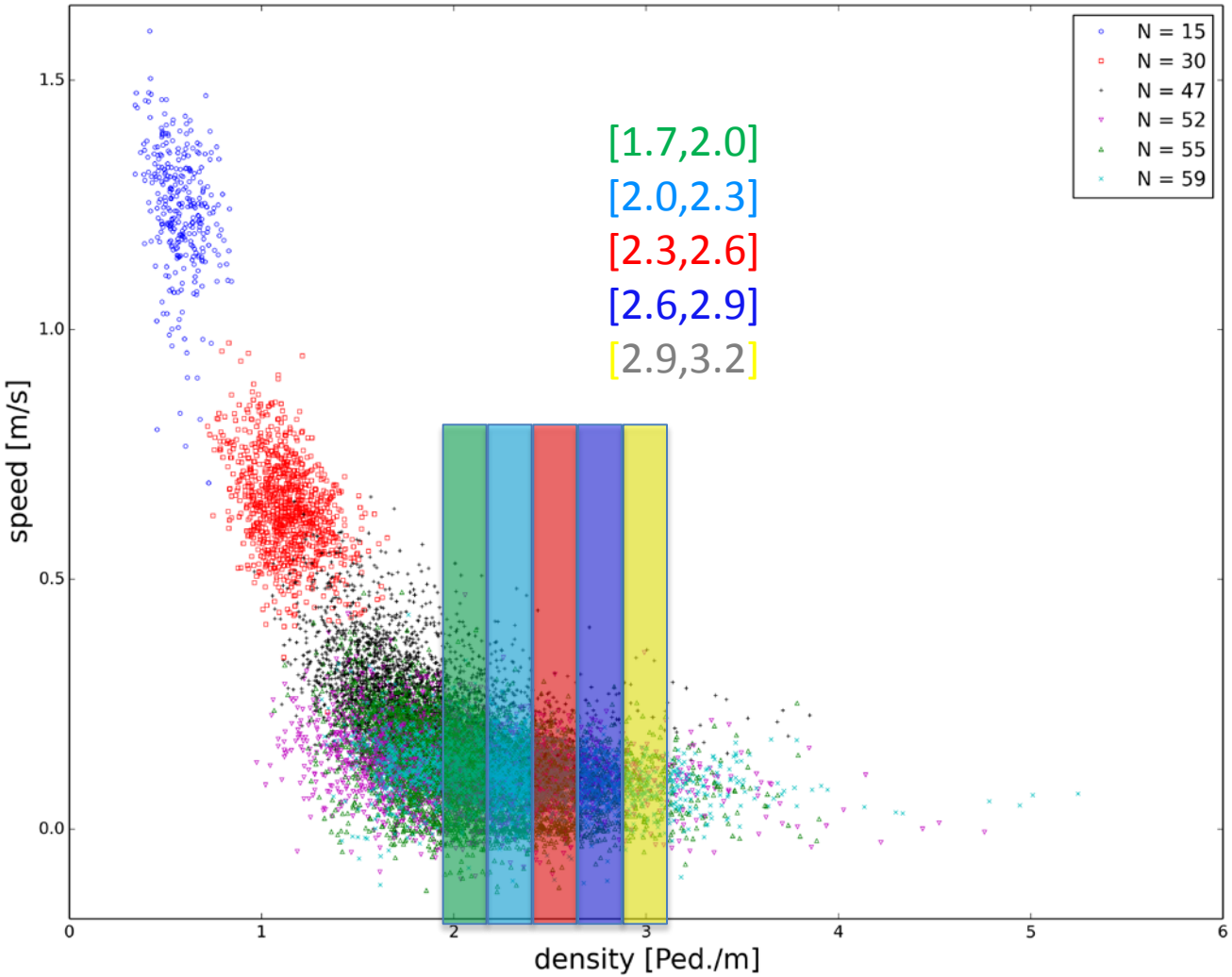


- Voronoi densitiy : 1/Voronoi space
- Voronoi space : half the distance between two neigbours
- Speed (time) : $\frac{x(time+\triangle time) - x(time-\triangle time)}{\triangle time}$

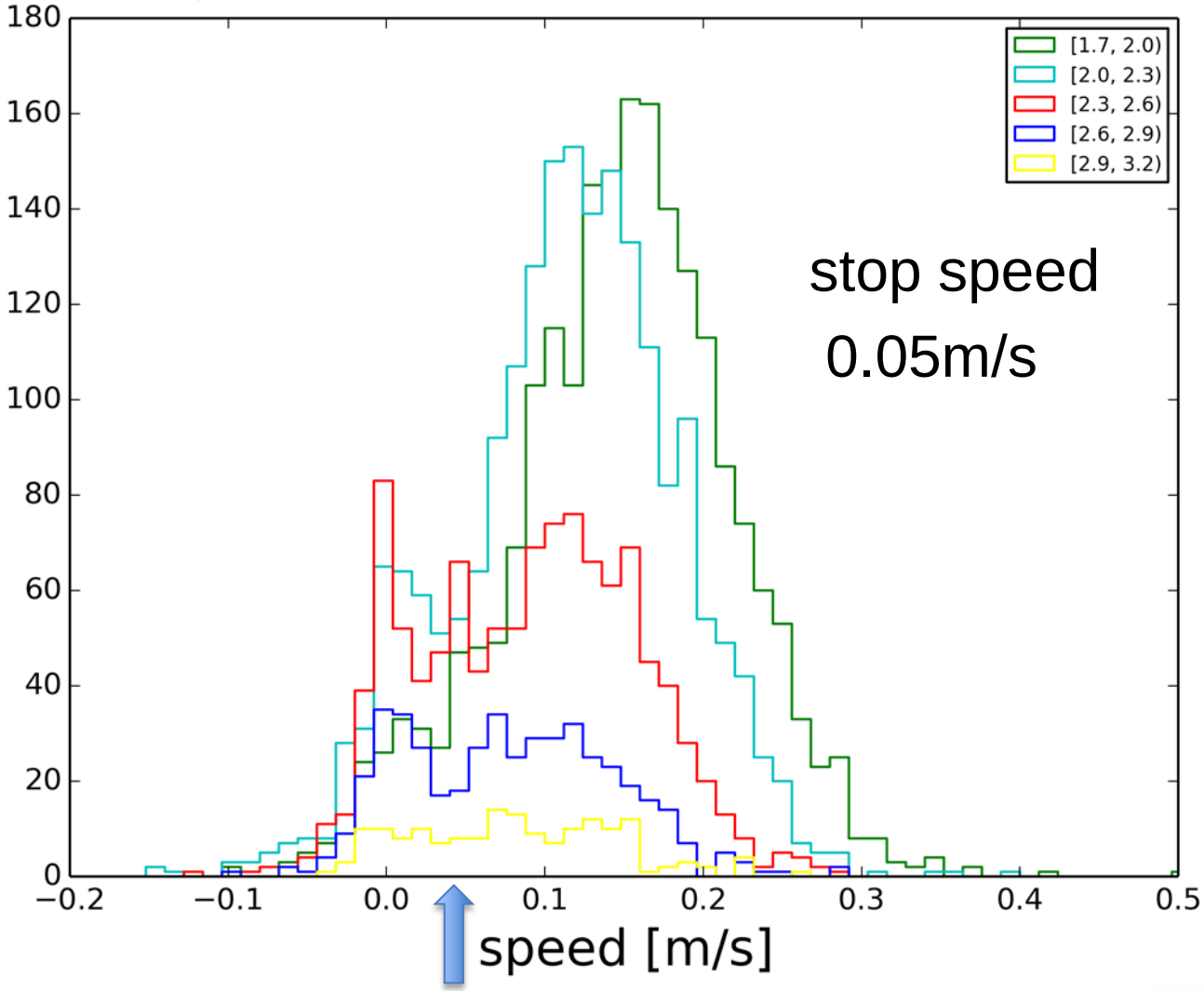

in line
in circle
speed [m/s]
density [Ped./m]
1.5
1.0
0.5
0.0
0
1
2
3
4
5

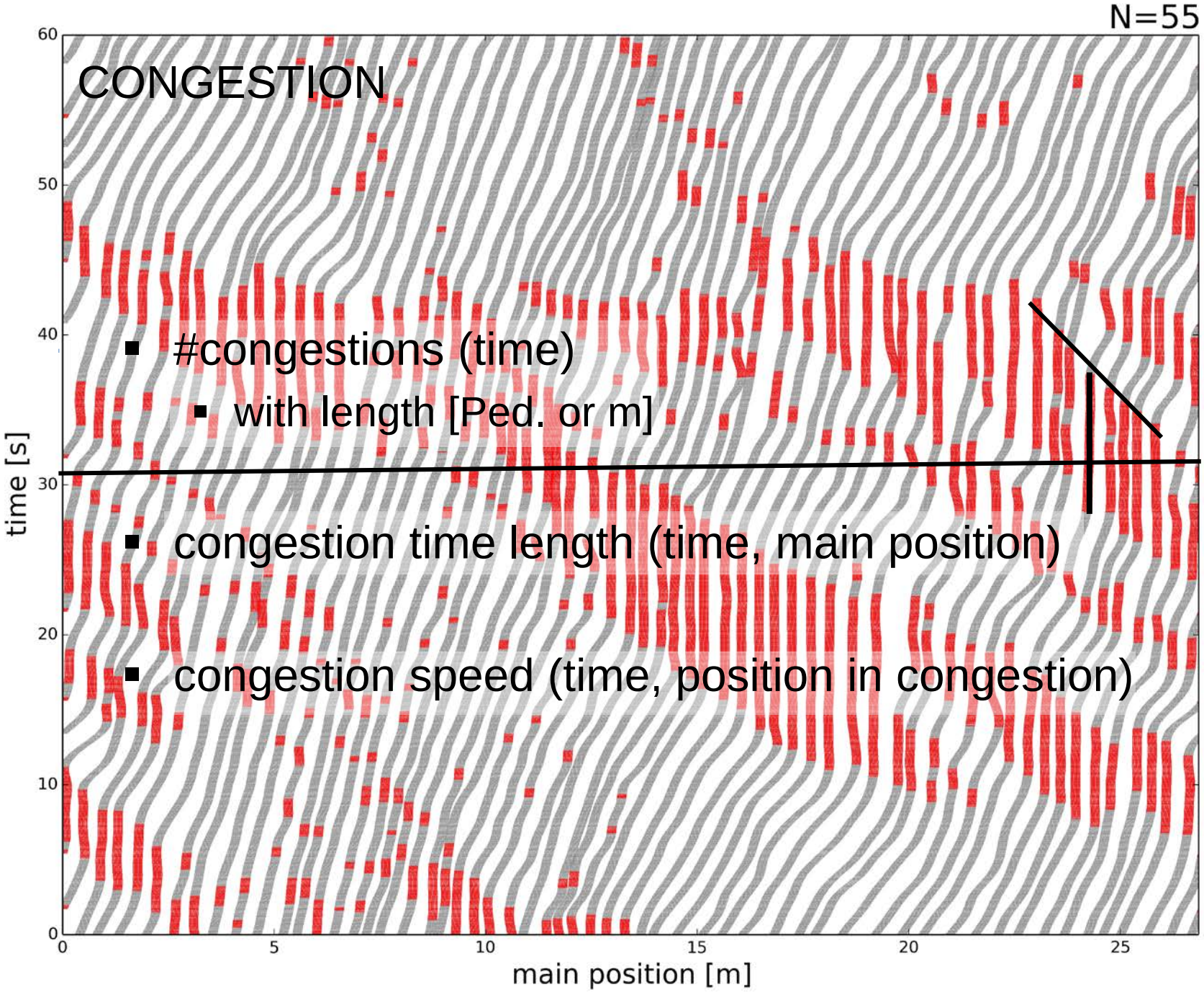

cloud in line
cloud in circle
merge clouds
speed
density
exp(a_2 (x - a_3))
a_1 = 1.51921
a_2 = -1.4894
a_3 = 0.41431
std-dev 0.09533
std-dev 0.0995
residual
ID
KS test p-value = 0.791
cloud: in line
cloud: in circle
frequency
residual

INDIVIDUAL FUNDAMENTAL DIAGRAMM



SPEED FREQUENCY





- #congestions (time)
  - with length [Ped. or m]
- congestion time length (time, main position)
- congestion speed (time, position in congestion)

THANK YOU FOR YOUR INTEREST !