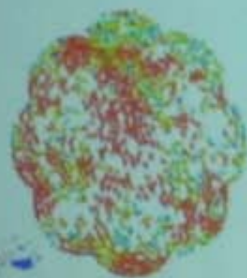


Self propelled particles with hard core repulsion



O. Dauchot
(EC2M, ESPCI)

J. Deseigne, H. Chaté
(CEA-Saclay)

A. Bricard, J.-B. Caussin,
N. Desreumaux, D. Bartolo
(PMMH, ESPCI)

C. A. Weber, T. Hanke
(E. Frey's group, Munich)

Labex MS2T, Compiègne, March 2014



EPIC UMR Guilbert

ECAM

Self propelled particles with hard core repulsion

G. Sussler
UMR ESPCI

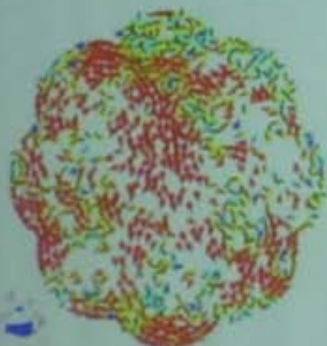
J. Bourgain, M. Chertu
UMR ESPCI

A. Winkel, J.B. Gollub,
M. Doyon, D. Sornette
UMR ESPCI

C. A. Murray, J. G. G. Gollub,
M. Doyon, D. Sornette



Self propelled particles with hard core repulsion



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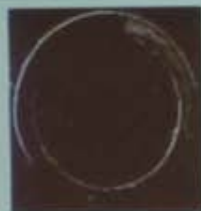
C. A. Weber, T. Hanke
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From disordered to polar state

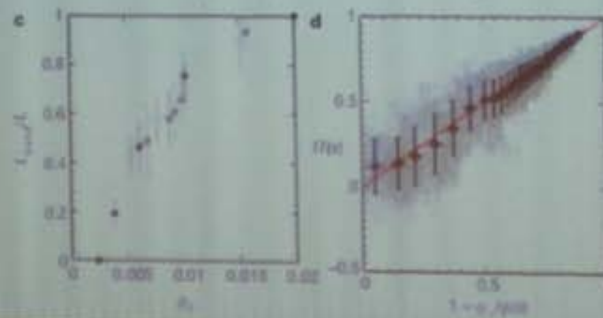
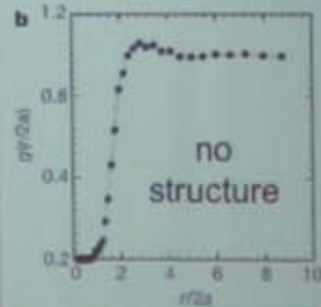
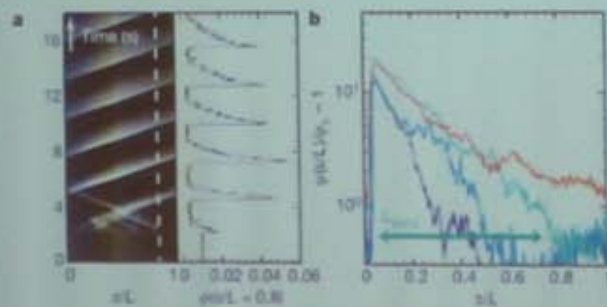
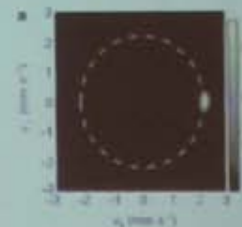
Isotropic state



Polar bands



Homog. polar state



From disordered to polar state

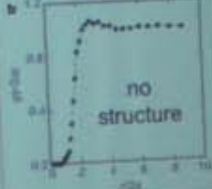
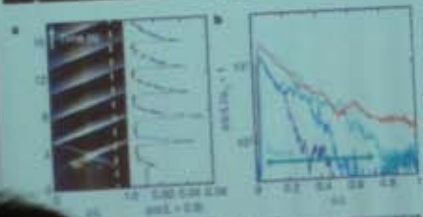
Isotropic state

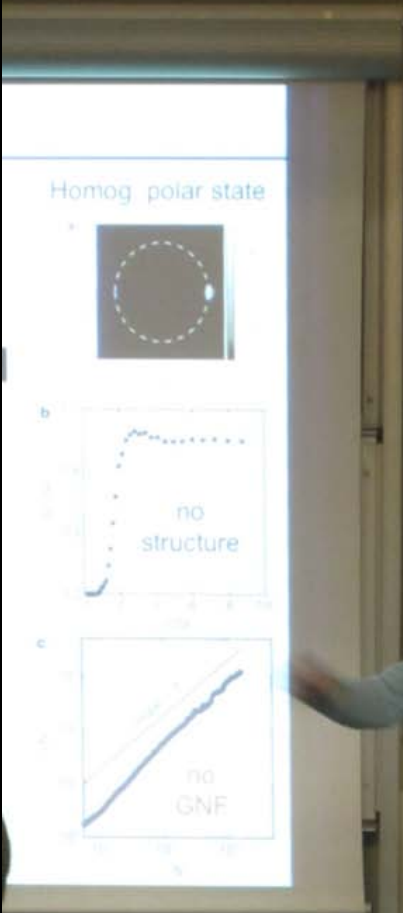


Polar bands



Homog. polar state







Never explain,
never compare

Never explain,
never compare



Interactions (electrostatics + far field hydrodyn.)

$$\dot{r}_i = v_0 \hat{p}_i$$

$$\dot{\theta}_i = \frac{1}{\tau} \sum_{(ij)} \frac{\hat{r}_{ij}}{r_{ij}^2} H_{\text{int}}(r_{ij}, \hat{p}_i, \hat{p}_j)$$

$$H_{\text{int}}(r, \hat{p}_i, \hat{p}_j) = \underbrace{A(r) \hat{p}_j \cdot \hat{p}_i}_{\text{alignment}} + \underbrace{B(r) \hat{r} \cdot \hat{p}_i}_{\text{repulsion}} + \underbrace{C(r) \hat{p}_j \cdot (2\hat{r}\hat{r} - \mathbf{I}) \cdot \hat{p}_i}_{\text{dipolar LR}}$$

alignment

repulsion

dipolar LR

$$\hat{\mathbf{p}}_j \cdot \hat{\mathbf{p}}_i + B(r) \hat{\mathbf{r}} \cdot \hat{\mathbf{p}}_i + C(r) \hat{\mathbf{p}}_j \cdot (2\hat{\mathbf{r}}\hat{\mathbf{r}} - \mathbf{I}) \cdot \hat{\mathbf{p}}_i$$



International communication & the field hypothesis 2

1. Introduction

2. The field hypothesis

3. The field hypothesis and the field hypothesis 2

4. The field hypothesis and the field hypothesis 2

5. The field hypothesis and the field hypothesis 2