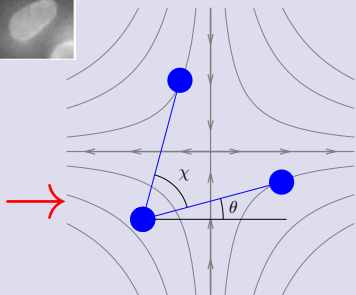
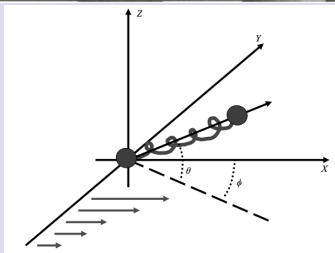
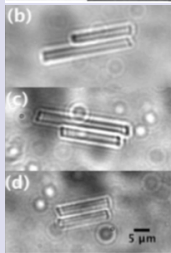
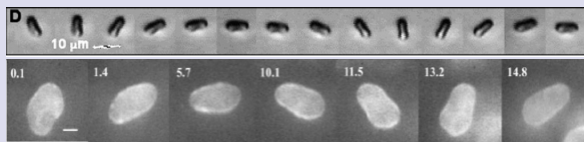


# Tumbling in an extensional flow

*Tumbling dans un écoulement extensionnel*

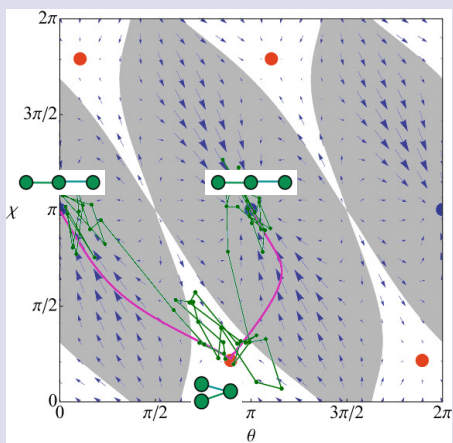


Tumbling in shear flows  
(red blood cells, vesicles, solid particles)

**Can we find tumbling  
in an extensional flow?**

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## A **trumbbell**

with an elastic hinge  
 performs a **random**  
**tumbling-through-folding** motion  
 in an extensional flow.

The **mean tumbling time**  
 grows *exponentially*  
 with  $Wi$  (Weissenberg number)  
*in contrast to the shear flow.*

