Experimental study of the interplay between hydrodynamical and visual interactions in fish schools

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This scientific project aims to investigate the mechanisms by which fish schools self-organize, focusing on the relative contributions of visual and hydrodynamic interactions. Fish are known to coordinate their movements through a combination of visual cues and hydrodynamic signals detected by their sensitive lateral line. To explore these dynamics, the experimental study will involve placing fish in a controlled flow environment where their interactions can be manipulated and observed under different conditions. By introducing corridors with transparent walls, the natural hydrodynamic interactions will be disrupted, allowing to isolate and examine the role of visual cues in schooling behavior.

The experimental setup will involve two scenarios: one with the transparent walls, where only visual interactions are possible, and another without the walls, where both visual and hydrodynamic interactions can occur. By comparing the schooling behavior in these two conditions, the project aims to determine whether vision or hydrodynamics plays a more dominant role in the self-organization of fish schools. This comparative analysis will provide insights into the fundamental processes underlying collective behavior in aquatic organisms, potentially informing broader applications in robotics, swarm intelligence, and environmental management.

To help us with this research, we are looking for an intern with strong experimental skills and a keen interest in animal behavior, physics and biomechanics. The intern will be actively involved in designing the experimental setups, maintaining the flow conditions, and analyzing the behavioral data to draw meaningful conclusions about the interplay between visual and hydrodynamic interactions in fish schooling. Our project also implies numerical approaches of the social and hydrodynamical interactions which will allow fruitful discussions between real life and simulations. This position takes place in a unique collaborative and multidisciplinary environment in the Laboratoire Interdisciplinaire de Physique in Grenoble.

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