

Giovedì 19 aprile 2018, ore 18.00, Aula Magna del Collegio Morgagni

Prof. Martino Trassinelli

Centre National de la Recherche Scientifique CNRS -
Institut des NanoSciences de Paris INSP

One deep breath to go 200 m deep in the sea: the physics of freedivers

Abstract

Dolphins, whales and other breath-hold mammals routinely reach depths of several hundreds of meters below the sea level with a relatively small quantity of oxygen in their lungs, achieving what is impossible to humans. At different depths they use the buoyancy and weight forces at their advantage with prolonged gliding phases to minimize the energy diving cost. With a simple mechanical model that considers the different forces acting on the diver, we demonstrate how this is possible and how the body characteristics of dolphins, penguins and other breath-hold animals are well adapted for deep dives. Considering the basal metabolism together with the drag dependency on the swim velocity, the optimal dive speed can be also calculated and compared to the observations. Finally we will make some energetic considerations about freediver athletes and what they can learn from marine mammal to improve their performances.