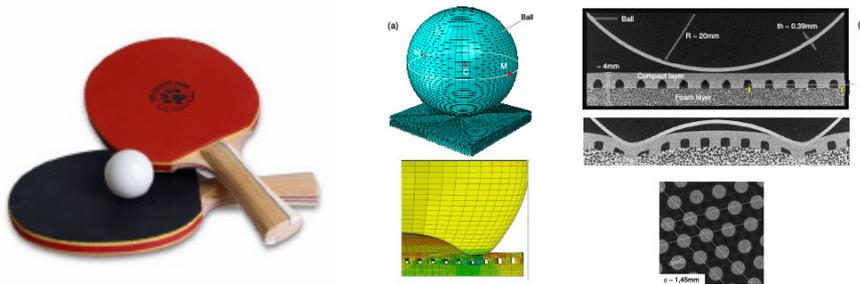


## Table tennis : the physics of rebound

The question of the rebound of a ball on a flat surface is classic, at first sight. However, the table tennis racket (or paddle) is a subtle assembly of layers of wood and polymeric materials (solid foam and rubber sheet). Depending on these components, the paddle is better suited to defensive or offensive game, allowing either a better control or enhanced effects given to the ball. We are thus facing the question of the rebound of a spherical shell on a complex surface (multiple layers, patterned surface). There does not exist any systematic study of the effects of the numerous parameters [thickness and mechanical properties of the foam and rubber sheet, geometrical properties of the surface (height, diameter, density of the pimples)]. We propose to fill this gap.



Paddles and ball, DEM simulation and X-ray tomography – Courtesy Rinaldi R. and Manin L.

We shall develop a device that makes possible to observe the rebound of a ball with chosen initial velocity and spin. By direct observation with a high-speed camera, we shall reconstruct the trajectory and, thus, measure the restitution coefficients, defined to be the relation between the input and the output velocities (translation and rotation). Our final aim is to obtain a clear view of the role played by any of the ingredients of the problem through experiment and modelling.

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