

# Optimal archery feather design depends on environmental conditions: study

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Impacts of arrows with different feathers on a target - INSEP, France. Credit: Tom Maddalena

When it comes to archery, choosing the right feathers for an arrow is the key to winning. This necessity for precision makes it crucial to understand how environment and design effect arrows in flight.

Scientists from the Laboratoire d'Hydrodynamique at the Ecole Polytechnique will explain the physics behind optimal [arrow](#) design at the 72nd Annual Meeting of the APS Division of Fluid Dynamics in Seattle. [The presentation](#) is part of a session on biological fluid dynamics in flight.

The researchers said the aspect of [feather](#) size and shape in archery accuracy not yet been studied in depth. To discover the optimal feather design, Tom Maddalena, Caroline Cohen and Christophe Clanet first shot arrows with various feathers using a throwing machine. They then used a [wind tunnel](#) to observe the aerodynamic forces on the arrow. These experiments were compared to theoretical models of arrow flight.

"We found that the best size depends on the [environmental conditions](#). If there is no [wind](#), a shooter must use very large feathers. The limit of the size is actually mostly dictated by geometrical constraints of the bow," said Maddalena.

The authors plan to further investigate environmental effects on the arrows. Although large feathers provide more stability, they're also affected more easily by the wind.

"We collaborated with the French Archery Federation to conduct this research. Currently, the choice of the feathers is based on intuition and comes directly from the athletes and their coaches. With our work, we hope able to tell them which feathers are the best, so that they can fully trust their equipment," said Maddalena.

**More information:** [www.apsdfd2019.org/](http://www.apsdfd2019.org/)

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