HEAT TRANSFER AND PHASE CHANGE ON THE BLACK RUN

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The sliding of skis is a fascinating but still unsolved problem. Although Man has walked on skis for more than 10 000 years, as it has been recently claimed by a Chinese archaeologist, a thorough understanding of the physics of skiing is still in its infancy.

There are several reasons why the design of down hill skis for competition is so difficult a problem:

- the skier, the skis, the snow and the ambient air constitute an interactive dynamic system,
- the ski is a composite structure with very peculiar dynamic properties,
- the thermophysical properties of snow are fuzzy,
- many intricate phenomena interact during the sliding of a ski on snow, such as load distribution, sole wettability and roughness, internal heat generation due to flexing, radiation, weather conditions, to name a few,
- the *in situ* measurement techniques and experiments are challenging.

The lecture will focus on the basic of ski sliding. Some heat transfer and phase change models will be proposed, based on a scale analysis of the phenomena involved. The measuring techniques will be presented and some experimental results will be discussed.

The lecture will be concluded by some considerations on the design of smart skis for downhill races and speed skiing competition.