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**Acoustics of the French Baroque Lute**

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Design innovations of the French baroque lute characterize the final plateau in the lutes' millennia long evolution in Europe before its eventual extinction at the end of the baroque period. They came with a dramatic increase in number of strings, a new tuning, the first physical description of string vibration, by Marin Mersenne, and led to the "style brisee" which became ubiquitous in baroque music. Compared to the violin, the lute experienced relatively large variations in design and construction material over its lifetime. The aesthetic effect of these variations on musical acoustics were and are often described in compelling but qualitative terms, even by players such as Aristotle and Constantjin Huygens. Here we will use fundamental theoretical principles to quantitatively analyze the acoustic effects of typical design and construction variations found in historic instruments, ranging from the material and thickness of sound boards, bracing and ribs, to rosette design and stringing. We will show how quantitative analysis can be reconciled with qualitative descriptions to help match lute design with desired sound quality.