The Kasha Guitar

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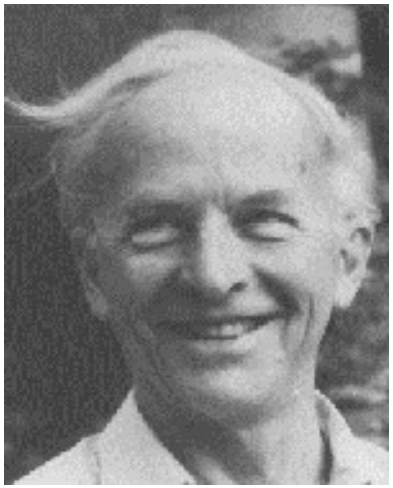
Michael Kasha



- Physical Chemist
- One of the founders of the Institute of Molecular Biophysics of FSU
- Worked with Luthier Richard Schneider in designing the first Kasha guitars

A Need for Improvement?

- Kasha noticed inefficiencies of the guitar from an instrument he bought for his son in the 1960s
- Classical guitars only convert around 5% of string vibrations to sound. (Majority is lost as heat)
- Traditional design has trade off between sustain and volume.

Kasha's Goal

- The goal was to create an improved design that converts 7 to 8% of vibrational energy into sound.

- Focus was on five key area's of the guitar:
  - Neck
  - Bridge
  - Soundboard
  - Bracing on soundboard
  - Bracing on back

General Physics of the Guitar

- String stretched between two fixed supports(the nut and the bridge)
- Fundamental frequency of the string is determined by string weight, tension, and length.
- The string itself is responsible for very little sound production
- Majority of sound comes from vibrations given to soundboard through the bridge

Kasha Guitar: Neck

- The Kasha guitar features a heavy, rigid neck
- This prevents loss of string energy due to vibrations in the neck
- This energy can now be used to excite the soundboard
- The weight of the neck increases treble response.

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Kasha Guitar: Bridge

- Uses an impedance dependent bridge
- It has a wedge shape instead of rectangular shape
- Wedge emphasizes bass at one end and treble at the other
- Designed to have as little mass as possible to increase responsiveness of string's vibrations.

Kasha Guitar: Soundboard

- Thinner bass half and thicker treble half to increase response
- Soundhole is moved from center to upper right area
- The upper right area is “silent” part of soundboard
- This creates a much larger vibrational area
- It also allows space for midrange frequency bracing

Kasha Guitar: Soundboard Bracing

- Kasha bracing reinforces bass and treble area differently
- Allows bridge to move in rotary as well as up and down.
- Heavy bracing gives good tone but low volume
- Light bracing gives poor tone but high volume
- Kasha guitar has heavy bracing for low notes and light bracing for high notes.

Kasha Guitar: Soundboard Bracing Cont.

Other Types of Guitar Bracing

Left: Fan Bracing Pattern
Right: Lattice Bracing Pattern

Kasha Guitar: Back

- Back of guitar is also designed with a bracing pattern to increase sound.
- It uses tonewood in a similar method to the way a diaphragm of a speaker works.
- Also similar to speaker, different sections for different frequency ranges.

Reactions to Kasha Guitar

- First drastic changes to the instrument since around the 1850s
- Hand built and only made by certain luthiers
- Expensive and hard to find
- These are all reasons why it is not as popular of a design as others

References

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Questions/Comments