

### V. Electronic Stringed Instrument Experiments:

#### 1. Strings:

- Use Digital Scope + FFT Harmonic Analysis of signals from strings, study different kinds/brands of strings - quality of intonation vs. brand, quality of intonation new vs. old strings.
- Stand-alone setup to measure string tension - balanced tension for sets of strings vs. brand? Propagation speed constant vs. frequency?
- Measure decay times of strings - study air damping and magnetic damping vs. string type/string brand.
- Study attack & harmonic content of picking techniques, pick type.

#### 2. Necks/Tuners/Nuts:

- Use Digital Scope + FFT Harmonic Analysis to study & compare different necks, neck woods, fretboard woods, neck finishes, neck damping, FatHeads, nut materials, etc.
- Studies of Mechanical Vibrational Properties of Guitar Neck/Headstock using PC-based LabWindows/CVI DAQ Sonic.prj program.

#### 3. Bridges:

- Bridge Intonation.
- Comparison of Sustain vs. Type/Design/Construction of Bridges?

#### 4. Bodies:

- Studies of Body Properties using PC-based Laser Holography Techniques.

#### 5. Pickups/Controls:

- PC-based LabWindows/CVI DAQ – Pickup.prj to measure complex impedance of pickups, L, R, C, resonant peak,  $f_{res}$ , Q.
- Use HP Dynamic Signal Analyzer to do same, more quickly, less detail...
- Use Digital Scope + FFT Harmonic Analysis to study pickup response, pickup location, picking location, picking techniques, coupling of sound from amp back to guitar.
- Active Pickups/Preamps.
- Study Loading of Pickup by Volume & Tone Controls, using above DAQ...
- Study Pickup Response for horizontal vs. vertical string oscillations.
- Pickup Winding Machine & Wind/Rewind Pickups, Physical Properties of Wire used in Pickups.
- New kinds of Wire for Pickups? (Ultra-Pure OFHC?).
- New kinds of Pickups (e.g. Linear Hall Effect Sensors?? GMR Sensors??).