INSTRUMENT	COMMENTS	MODES (fundamental f_1 and partials)
STRINGS	String held under tension at two ends: $f_1 = v/2L$, where $v = (T/m)^{1/2}$ is velocity of wave *on string*	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Acoustic Guitar	Plucked strings; bridge couples string vibration to sounding board	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Electric Guitar	Plucked strings; electromagnetic transducer couples string vibration to an electronic signal	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Harsichord	Plucked keyboard instrument; can't vary loudness	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Piano	Complex key action allows variation of loudness	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Violin, Cello, etc.	Intricate sound board couples all frequencies well. Bowing action gives rapid stick/slip oscillation	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
WINDS	Tubular air resonator with finger holes first open hole from top determines effective length L). One or more "register holes" near mouthpiece produce an octave or more higher when opened.	
Organ pipes (no finger or register holes)	Open/open or open/closed nearly cylinderical pipes. Source coupling: air blown around obstacle open ended: $f_1 = v/2L$ (v = velocity of sound). closed ended: $f_1 = v/4L$	open: f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic) closed: f_1, $3f_1$, $5f_1$, $7f_1$,…(odds only)
Recorder	Open/open ended cylindrical pipe, $f_1 = v/2L$ Source coupling: air blown around obstacle	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Flute (transverse)	Open/open ended cylindrical pipe , $f_1 = v/2L$ Source coupling: air blown across transverse hole at top	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Clarinet	Closed/open ended pipe with finger holes, $f_1 = v/4L$ Source coupling: single reed vibrates against mouthpiece	f_1, $3f_1$, $5f_1$, $7f_1$,… (odds only)
Oboe, Bassoon, English Horn	Conical pipe [like open/open pipe!], $f_1 = v/2L$ Source coupling: double reed vibrates against eachother	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Saxophone	Conical pipe [like open/open pipe!], $f_1 = v/2L$ Source coupling: single reed vibrates against mouthpiece	f_1, $2f_1$, $3f_1$, $4f_1$,… (harmonic)
BRASS		
Trumpet, French Horn, Euphonium (baritone), Tuba	Closed/open coiled tubing. Mouthpiece at input and tapered bell at output strongly influence modes. Three valves change tubing length; overblowing mouthpiece allows higher partials Source coupling: lips vibrate inside mouthpiece Pedal tone: rough vibration at $f_1/2$ (octave below fundamental)	f_1, $1.5f_1$, $2f_1$, $2.5f_1$,… (plus pedal tone at $0.5f_1$)
Trombone	Same as trumpet family, with continuous sliding tube length instead of valves	f_1, $1.5f_1$, $2f_1$, $2.5f_1$,… (plus pedal tone at $0.5f_1$)
PERCUSSION	Usually a complex mode spectrum, and often not pitched (noisy)	
Unpitched percussion: snare drum, bass drum	Two-dimensional modes complicated and not usually harmonic. no pitch here, but a contribution from a near continuum of frequencies	
Cymbals, tam-tam	Metallic disks (usually bronze) producing noisy splashing sound, no definite pitch	
Gong	Metallic disks (usually bronze) producing splashing sound with definite fundamental pitch	
Pitched drums: Timpani (or Kettle) Drums	Lowest frequency mode dies fast and is percussive and dissonant; next several modes are near harmonics, carefully engineered by shape of kettle bowl beneath drum head	f_1, $1.5f_1$, $2f_1$, $2.5f_1$, $3f_1$,…
Marimba	Rosewood bars suspended and shaved so that first partial is at $4f_1$. Resonator underneath has fundamental mode air mode at f_1	f_1, $4f_1$, …
Xylophone	Rosewood bars suspended and shaved so that first partial is at $3f_1$. Resonator underneath has fundamental mode air mode at f_1	f_1, $3f_1$, …
Vibraphone, Glockenspiel	Metal bars suspended and shaved so that first partial is at $4f_1$. Resonator underneath has fundamental mode air mode at f_1. Oscillating dampers above resonator produces tremolo in volume.	f_1, $4f_1$, …
Tubular Bells (Chimes)	Nearly harmonic series of partials, but fundamental is absent. We hear fundamental anyways!!!	(f_1 heard but absent), $2f_1$, $3f_1$, $4f_1$,… (harmonic)
Carillon Bells	Bell shape produces a minor triad and a major triad one octave higher. Plus "buzz tone" one octave below f_1 fundamental	f_1, $1.2f_1$, $1.5f_1$, $2f_1$, $2.5f_1$, $3f_1$, $4f_1$,…