

Wilsonic

- MTS-ESP + Simple Synth

WilsonicController

- MTS-ESP + MIDI Effect

wilsonic.co

Public Beta [Downloads](#)

- [MacOS 0.38 Beta](#)
- [Windows 10 64-bit 0.38 Beta](#)

Support in [Wilsonic Discord](#)

Updated 2024-04-22



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What is MTS-ESP?

- MTS-ESP is a protocol for automatically and invisibly sharing tuning data between plug-ins in a DAW in real-time, without any routing or other setup required. [ODDSound Github link](#)
- MTS-ESP does not use MIDI data and is not routed through MIDI connections in a DAW.
 - Wilsonic is an MTS-ESP Source and has a simple synth for reference tones
 - WilsonicController is both an MTS-ESP Source and a MIDI Source, but has no simple synth
- Sharing of tuning data happens directly between plug-ins. It does not involve the DAW at all and therefore it will work in any DAW.
- Developers must explicitly add support for MTS-ESP to their plug-ins for this to work. A list of supported plug-ins can be found [here](#)
- Most synths that support MTS-ESP will automatically retune to Wilsonic when loaded, however some have a UX preference to enable MTS-ESP (like SurgeXT).
- Synths that don't natively support MTS-ESP can usually be retuned using MIDI pitch bend messages. This can even work polyphonically for synths that support MPE.

What is MTS-ESP?

- Synths that don't natively support MTS-ESP can usually be retuned using MIDI pitch bend messages. This works best for synths that support MPE.
- Re-tuning via MIDI pitch bend requires a plug-in that can receive tuning data via MTS-ESP and generate MIDI pitch bend messages in response. Available options are:
 - Paid:
 - ODDSound MTS-ESP MIDI Client (part of the MTS-ESP Suite)
 - Free:
 - Ableton Microtuner M4L device (in MTS-ESP client mode) and
 - Xen MIDI Retuner
- The Wilsonic installer includes everything required for MTS-ESP to work on your computer, however if you have problems you can do a clean install of the MT-ESP components here
 - Mac-specific MTS-ESP [installer](#)
 - Windows-specific MTS-ESP [installer](#)

Architecture

- Wilsonic should be the *only* MTS-ESP **Master** active in your DAW/Host session
- Your software synths are the “**clients**”

Desktop

DAW/Host

Wilsonic
MTS-ESP
Master:

*Global
Tuning
Table*

**MTS-ESP
Clients:**

Software
Synths that
natively
support
MTS-ESP

**ODDSound
MTS-ESP Midi
Client**

Software
Synths that
support
MPE

**Ableton
Microtuner M4L**

Software
Synths that
support
MPE



See [Wilsonic MTS-ESP](#)

MTS-ESP Status Indicator: Green

- Wilsonic should be the *only* MTS-ESP Master active in your DAW/Host session
- The green indicator means Wilsonic is actively managing the global tuning table
- Do not run Wilsonic and WilsonicController simultaneously—I'm still figuring out how to gracefully manage multiple apps wanting to be the Master
- Hover over status label for status history

The screenshot displays the Wilsonic software interface. At the top, the title bar reads "Wilsonic". Below it, there are control buttons for "Options", "Moments of Symmetry" (with a dropdown menu), and navigation arrows. The main area features several sliders for parameters: "C" (0.238186), "P" (2.000000), and "M" (0). A "Cartesian" checkbox is also visible. Below the sliders is a grid showing various ratios (1, 1/2, 1/3, 1/4, 1/5, 2/9, 3/13, 4/17, 5/21, 6/25) with corresponding colored bars. At the bottom, there are three sections: "Period Middle C" (0), "Note Number Middle C" (60), and "Frequency Middle C" (261.625580). The bottom-most part of the interface shows a piano roll with notes and a network diagram on the left.

A green box highlights the status indicator, which is a green circle with the text "Wilsonic registered as MTS-ESP Source". A tooltip is visible over this indicator, containing the following information:

- Wilsonic v0.34
- (c) 2023 Marcus Satellite
- MTS-ESP Status
- Wilsonic is registered as the MTS-ESP Source
- Connected to 0 clients.
- Documentation (opens in your browser)

The word "STATUS" is written in large green letters in the top right corner of the image.

MTS-ESP Status Indicator: Yellow

- This status may appear if there is another plug-in already managing the global tuning table, or after a crash.
- The yellow indicator means this instance of Wilsonic is NOT actively managing the global tuning table.
- Check there is no other instance of Wilsonic or any other MTS-ESP master plug-in in use, then select “Register” from the menu to make Wilsonic the master.

The screenshot shows the Wilsonic software interface. At the top, there is a title bar with "Options" and "Wilsonic". Below it, a star icon is next to a dropdown menu labeled "Moments of Symmetry" with minus and plus buttons. The interface displays several control knobs: "G" (0.236186), "P" (2.000000), and "M" (0). A frequency value of 1.17951 is shown. Below these are several horizontal bars representing different ratios: 1, 1/2, 1/3, 1/4, 1/5, 2/9, 3/13, 4/17, 5/21, and 6/25. At the bottom, there are three input fields: "Octave Middle C" (-1), "Note Number Mid..." (55), and "Frequency Middle C" (261.6). A piano roll at the bottom shows notes 48 through 68 with various colored dots and lines. A yellow warning icon is visible in the top right corner of the interface. A tooltip window is open, displaying the following text:

Wilsonic v0.24
by Marcus Satellite

▲ MTS-ESP Status
Wilsonic is NOT registered as the MTS-ESP Master
This is likely because it did not shut down properly.
Register Wilsonic as MTS-ESP Master

Documentation
(opens in your browser)

Installation

- Download installer at wilsonic.co
- Run installer
- Reboot your machine
- Run as a Plugin in your favorite DAW
 - Rescan plugins
 - Load Wilsonic as a AUv2 or VST3 on a MIDI track
 - Wilsonic's "simple synth" can be played from this track. Check that your synths are tuned.
 - Wilsonic's DAW automation will be on this track
 - Load your soft synths in other tracks per the [ODDSound client documentation](#)
 - See [next slide](#) for more details
- Run as a standalone:
 - Standalone synths such as Surge and Pianoteq are tuned up in real-time!



MTS-ESP Overview

- [ODDSound MTS-ESP Overview](#)
- [ODDSound Client Support \(DAW+Soft Synth setup\)](#)
 - Ableton
 - Bitwig
 - Cakewalk
 - Cubase/Nuendo
 - Digital Performer
 - FL Studio
 - Kontakt
 - Logic Pro
 - Reaper
 - and many more
- [How To Install ODDSound Plug-ins \(Mac and Windows\)](#)
- [Microtuning in Ableton Live with MTS-ESP](#) (YouTube)
- [Microtuning in Bitwig Studio with MTS-ESP](#) (YouTube)



Microtonal Keyboard

These 3 controls define the global tuning table root frequency:

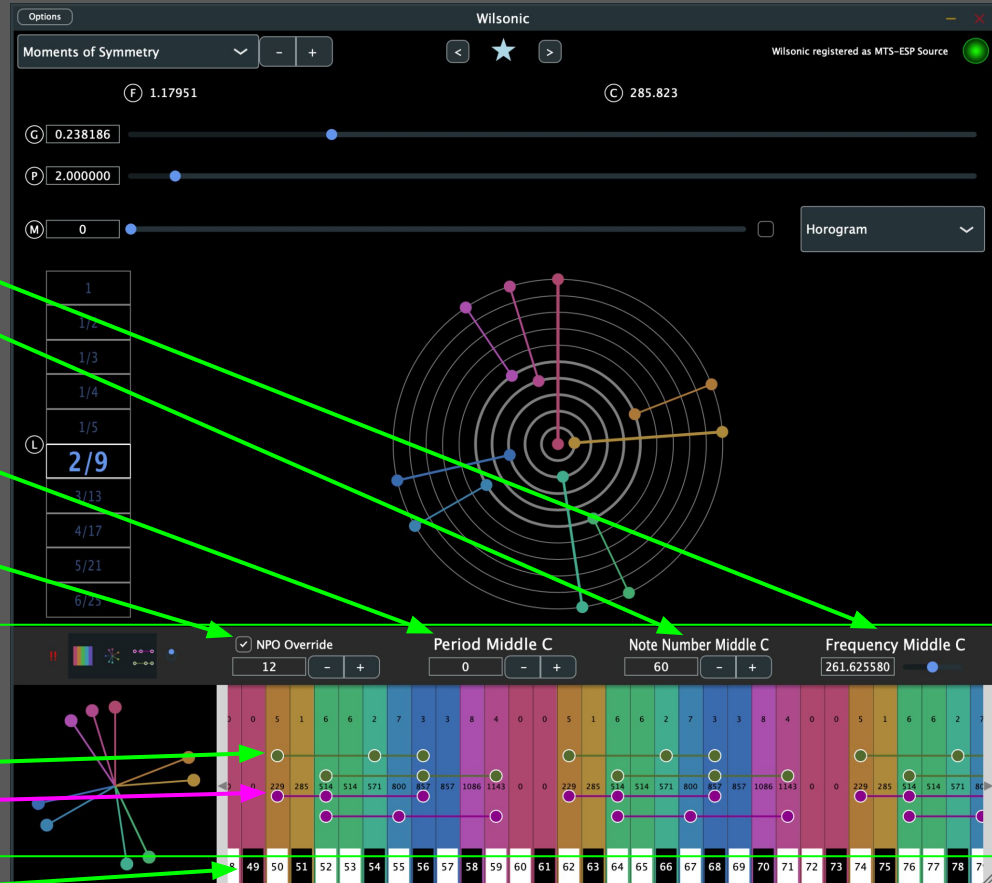
- Frequency of Middle C
- Note Number Middle C:
 - Default = 60
 - TRANPOSE = PERFORMANCE
- Period Middle C:
 - lower/raise all notes by this octave/period
- Automatable in the DAW!
- Notes Per Octave (NPO) Override adds/removes notes
- Resize keyboard by dragging bar vertically

Real-time Major/Minor Analysis:

Pythagorean Means

- Arithmetic Mean: “Proportional Triad”
- Harmonic Mean: “Subcontrary Triad”

MIDI Note Number Mapping + Black and White Keys of linear keyboard



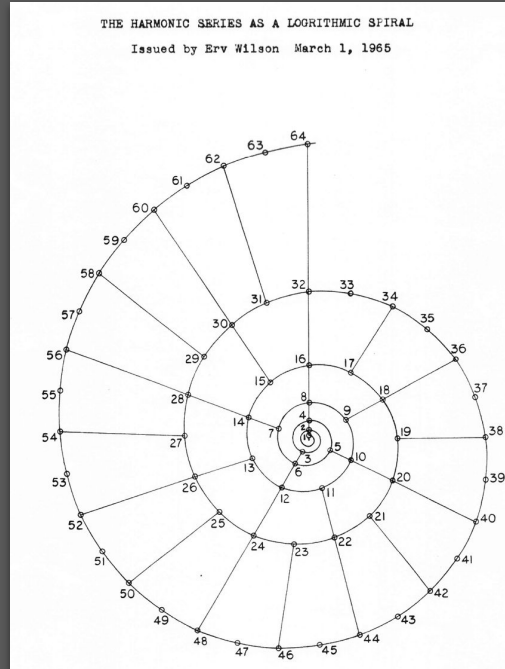
Microtonal keyboard is updated in real-time (!)

Pitch Wheel

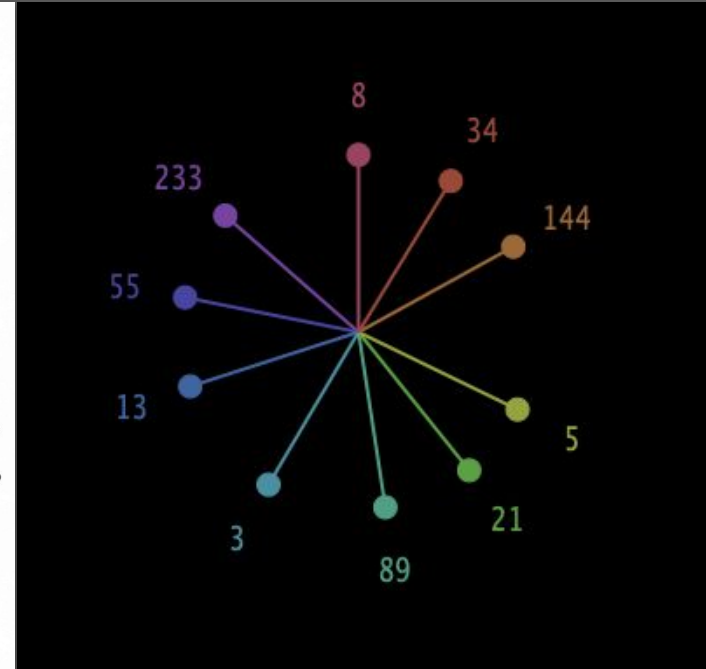
Pitch Wheel

- Pitch Wheels appear throughout the app
- Pitch is defined as $\log \text{base-Period of Frequency}$
- $\text{Period} = 2 = \text{Octave}$: the most common period
- The Pitch Wheels also take the modulus of Period
- $\text{Period} = \text{Octave Equivalence}$: $1=2=4=8=16=32=64=\dots$
- 12 o'clock = C = "1" = 2^0
- The colors of the Pitch Wheels correspond to the colors of the microtonal keyboard
- Wilsonic supports non-octave tunings such as Scala files and MOS
- When you change the Period the appearance of the Pitch Wheels do not change because by definition they are log-base-period

Log Base 2 of Frequency, drawn as a log2 spiral



Log Base Period of Frequency, drawn as a circle



Favorites

- Toggle Favorites panel by clicking on Favorites star icon
 - Favorites takes up 1/3 of the vertical screen space: you can resize Wilsonic to increase the height
- Navigate Favorites by hitting “<”, or “>” buttons
- Toggle to save NPO Override with Favorite
- Toggle to save Period with Favorite
- Toggle to save Note Number Middle C with Favorite
- Toggle to save Frequency Middle C with Favorite
- Save current scale as a Favorite by hitting “+” button
- Delete a selected row by hitting “backspace”
- Double-click Description cell to edit description
- Tap column header to sort by:
 - ID
 - Design
 - NPO (“number of notes per octave”),
 - Description

The screenshot shows the Wilsonic software interface. At the top, there's a search bar with "Euler Genus 6" and a star icon for favorites. Below it are checkboxes for "NPO Override", "Period", "Note Number", and "Frequency". A table lists favorites with columns for ID, Icon, Design, NPO, Description, and Parameters. The table is sorted by NPO. Below the table are control panels for NPO, Period, Note Number, and Frequency, each with a value and +/- buttons. At the bottom, there's a keyboard layout with colored keys and a scale diagram.

ID	Icon	Design	NPO	Description	Parameters
182		Euler Genus 6	6		CPS_4_2(1,135,19,377)*45
183		Euler Genus 6	10		CPS_5_3(45,135,225,17,377)
184		Euler Genus 6	6		CPS_6_1(15,35,45,55,63,75)
185		Euler Genus 6	6		CPS_6_5(15,35,45,55,63,75)
186		Euler Genus 6	10	debugging proportional triads	CPS_5_3(1,45,135,225,19)*377
190		Euler Genus 6	6		CPS_4_2(1,45,19,377)*225

Control panels:

- NPO: 12
- Period Middle C: 0
- Note Number Middle C: 60
- Frequency Middle C: 261.625580

Keyboard layout (bottom):

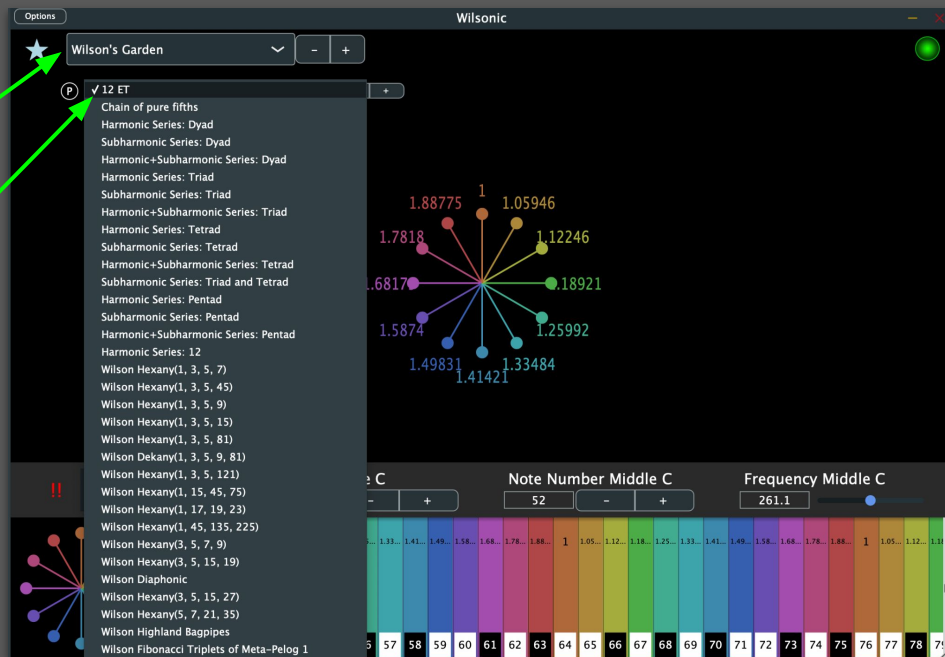
DEF	BDF	ADE	ABD	ADF	BDE	DEF	BDF	ADE	ABD	ADF	BDE	DEF	BDF	ADE	A
58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	7

“Wilson’s Garden”

- Select “Wilson’s Garden” from the Scale Design menu
- Select a scale from the “Curated Presets” menu

Curated scales by

- Erv Wilson
- Kraig Grady
- Stephen James Taylor
- Jose Garcia
- Gary David
- Marcus Hobbs
- Elementary, archetypal scales



*Be sure to also explore the [Scala Archives](#)

Moments of Symmetry

[Link to Erv Wilson's MOS papers](#)

- Select “Moments of Symmetry” from the Scale Design menu
- Select the Generator with the slider.
 - Units are in “Pitch space”, i.e., Log-base-Period of Frequency
 - 0 = Middle C
 - 1 = C one Period higher
 - $G = 0.58333 = 7/12 = 12$ tone equal temperament when Period = 2
 - The “F” label is the Generator in Frequency
 - the “C” label is the Generator in Cents
- Select the Period with the Slider
 - Units are in Frequency, default is “2”, the Octave
- Select the Murchana with the slider
 - Murchana is a type of mode, or rotation
- Select the Level by click-dragging over the Level box



Four drawing modes:

- Cartesian
- Horogram
- Horogram Inverse
- Gral (continuum of generalized keyboards)

Moments of Symmetry

Supports “Touch” Devices

- Select “Gral” from the display mode popup
- A secondary Level box appears...this is the keyboard mapping. The denominator is the number of columns in an octave. Shown here is the 4/7 layout of the 18/31 MOS.
- The toggle will set Murchana to 0 at the center of the chain, automatable
- The first rotary is the zoom
- The second rotary is the rotation. Leave this at 0 for Wilsonic to optimize for horizontal layout
- The third rotary is “shear” which you can use to make the columns vertical
- The fourth rotary is the left-right position of the keyboard
- The fifth rotary is the up-down position
- Hex tiles have the same label as the Microtonal keyboard

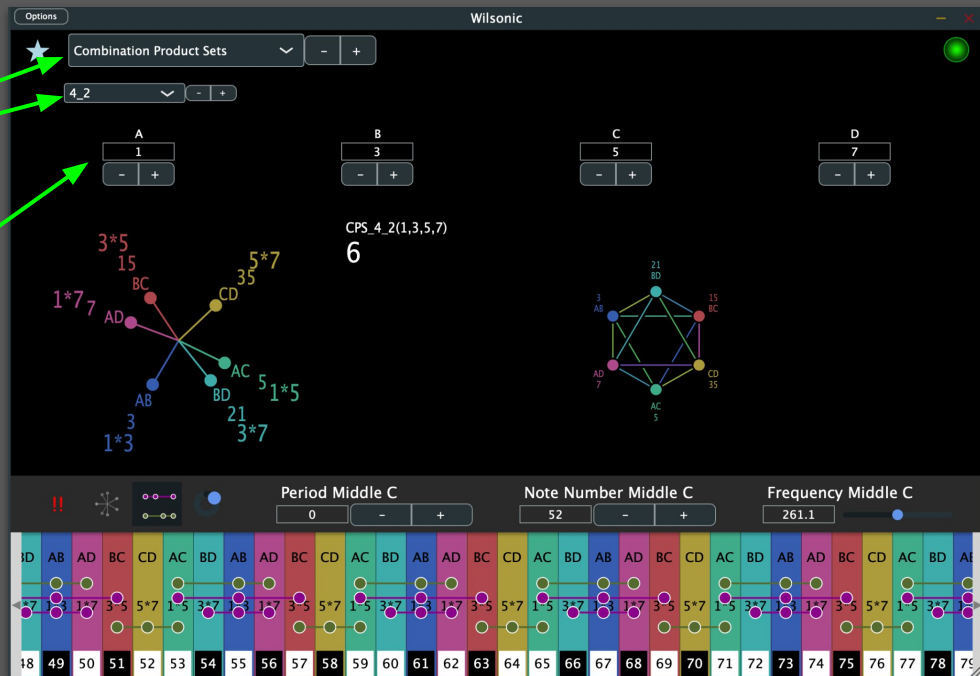
The screenshot displays the 'Moments of Symmetry' application interface. At the top, the title 'Wilsonic' is visible. Below it, the 'Moments of Symmetry' dropdown menu is set to 'Wilsonic'. The interface features several control panels: a 'Level' box with a value of 1.49902, a 'Zoom' rotary set to 0.580740, a 'Rotation' rotary set to 2.000000, and a 'Murchana' rotary set to 15. The main display area shows a hexagonal grid of notes, with a central note labeled '0'. The grid is color-coded and labeled with numbers. A 'Gral' display mode popup is visible on the right. At the bottom, there are three panels: 'Period Middle C' with values 0, -, +; 'Note Number Middle C' with values 60, -, +; and 'Frequency Middle C' with a value of 261.600006. A keyboard layout is shown at the bottom left, with notes labeled with numbers from 50 to 91.

Combination Product Sets

Combination Product Sets

- Select “Combination Product Sets” from the scale design menu
- Select the CPS from the scale menu
 - “4_1” = “4 choose 1” = Harmonic Tetrany
 - “4_2” = “4 choose 2” = Hexany
 - “4_3” = “4 choose 3” = Subharmonic Tetrany
 - “6_3” = “6 choose 3” = Eikosany
- Set the seeds (A, B, C, D) of the master set

More CPS resources [here](#)

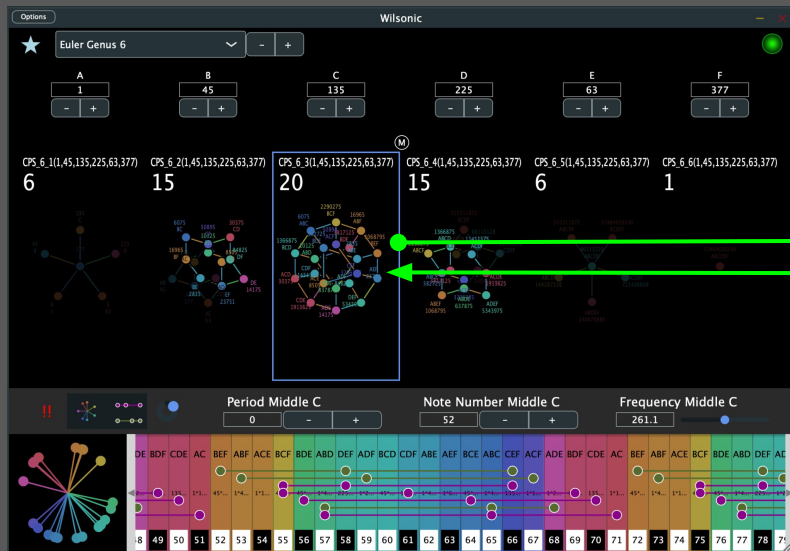


Euler Genus 6

Euler Genus 6

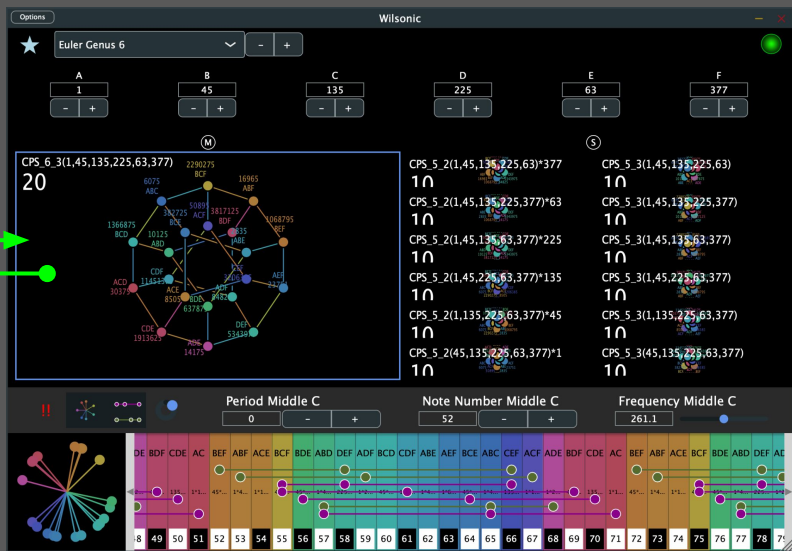
Euler Genus 6 page

- Seeds can be changed on every page
- Selected scale is outlined in blue
- Shift-Mouse-Hover selects scale
- Cursor Left-Right selects scale
- Ctrl-Click drills into Subset page



Euler Genus 6 Subset page

- Seeds can be changed on every page
- Selected scale is outlined in blue
- Shift-Mouse-Hover selects scale
- Ctrl-Click navigates down into subset
- Command-Click navigates up into superset
- Cursor Left-Right-Up-Down selects scale
- Superset on the left, subsets on the right



“Subsets of Combination Product Sets”

Wilsonic scale designs of “Combination Product Sets” and “Euler Genus 6” are implementations of these canonical microtonal papers:

- [D'Allesandro, Like a Hurricane](#), Erv Wilson,
- [Combination-Product Set Patterns](#), Kraig Grady, 1986
- [THE EIKOSANY VIEWED FROM THE CENTERED PENTAD LATTICE](#), Kraig Grady
- [THE EIKOSANY VIEWED FROM A HEXANY LATTICE](#), Kraig Grady
- Cycle of Hexanies in a Dekany, Kraig Grady, 1998
- [Resources Of The Eikosany](#), Kraig Grady, 1985

Recurrence Relation

Recurrence Relation

- Select “Recurrence Relation” from Scale Design menu
- Select the **terms** of the recurrence relation from the dropdown.
- Selected terms are highlighted in blue
- Select the **number** of terms to compute
- Select the **offset** (throws away previous terms)
- Set your **Seeds** for each term (initial conditions)
- Set your **Coefficients** for each term from the dropdown
- Final Scale:
 - Sorted as if octave-reduced
- Period is 2 (i.e., an octave)
- Recurrence Relations optimize for difference tones by creating an additive sequence

The screenshot shows the Wilsonic software interface for configuring a recurrence relation. The main window is titled "Wilsonic" and has a "Recurrence Relation" dropdown menu. Below the menu, the recurrence relation is set to $H[n] = H[n-3] + H[n-4]$. The terms $H[n-3]$ and $H[n-4]$ are highlighted in blue. The number of terms to compute is set to 2, and the offset is 0. The seeds for each term are 384, 288, 216, 162, 1, 1, 1, 1, 1, 1. The coefficients for each term are 1, 1, 2, 1/2, 1, 1, 1, 1, 1, 1. The final scale is displayed as a sequence of numbers: 84, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912, 513, 288, 162, 684, 384, 216, 912. The scale is sorted as if octave-reduced, with the period being 2 (i.e., an octave). The interface also shows a graph of the sequence and a table of the final scale.

Options

Recurrence Relation

Terms: 7

Offset: 0

$H[n] = H[n-3] + H[n-4]$

$H[n-1]$: 384
 $H[n-2]$: 288
 $H[n-3]$: 216
 $H[n-4]$: 162
 $H[n-5]$: 1
 $H[n-6]$: 1
 $H[n-7]$: 1
 $H[n-8]$: 1
 $H[n-9]$: 1

Coefficients: 1, 1, 2, 1/2, 1, 1, 1, 1, 1, 1

Integer Sequence, including seeds:
162, 216, 288, 384, 513, 684, 912

Sequence converges to:
F = 1.333333
P = 0.415038

Final Scale:
513, 288, 162, 684, 384, 216, 912

Period Middle C: 0
Note Number Middle C: 52
Frequency Middle C: 261.1

84 384 216 912 513 288 162 684 384 216 912 513 288 162 684 384 216 912 513 288 162 684 384 216 912 513 288 162 684 384 216 912 513 288 162 684 384 216 912

18 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79

Equal Temperament

“Equal Temperament”

- Select “Equal Temperament” from the Scale Design menu
- Select an ET (“EDO”) from 1-128 notes per octave
- Select the period. “Octave” = period of 2

The screenshot shows the Wilsonic software interface for setting up an Equal Temperament scale. The window title is "Wilsonic". At the top, there is an "Options" menu with "Equal Temperament" selected. Below this, there are two sliders: "N" (Notes per octave) set to 13, and "P" (Period) set to 3.000000. A circular diagram shows 13 notes arranged in a circle, numbered 0 through 12. Below the sliders is a horizontal bar with 13 colored segments. At the bottom, there are three input fields: "Period Middle C" (0), "Note Number Middle C" (60), and "Frequency Middle C" (261.1). Below these fields is a piano roll showing 13 notes, numbered 1 through 13, with their corresponding frequencies and note numbers.

Note	Frequency	Note Number
1	261.1	60
2	261.1	61
3	261.1	62
4	261.1	63
5	261.1	64
6	261.1	65
7	261.1	66
8	261.1	67
9	261.1	68
10	261.1	69
11	261.1	70
12	261.1	71
13	261.1	72

Tritriadic

“Tritriadic” by John Chalmers

- Select “Tritriadic” from the Scale Design menu
- Select the Mediant with the slider
- Select the Dominant with the slider

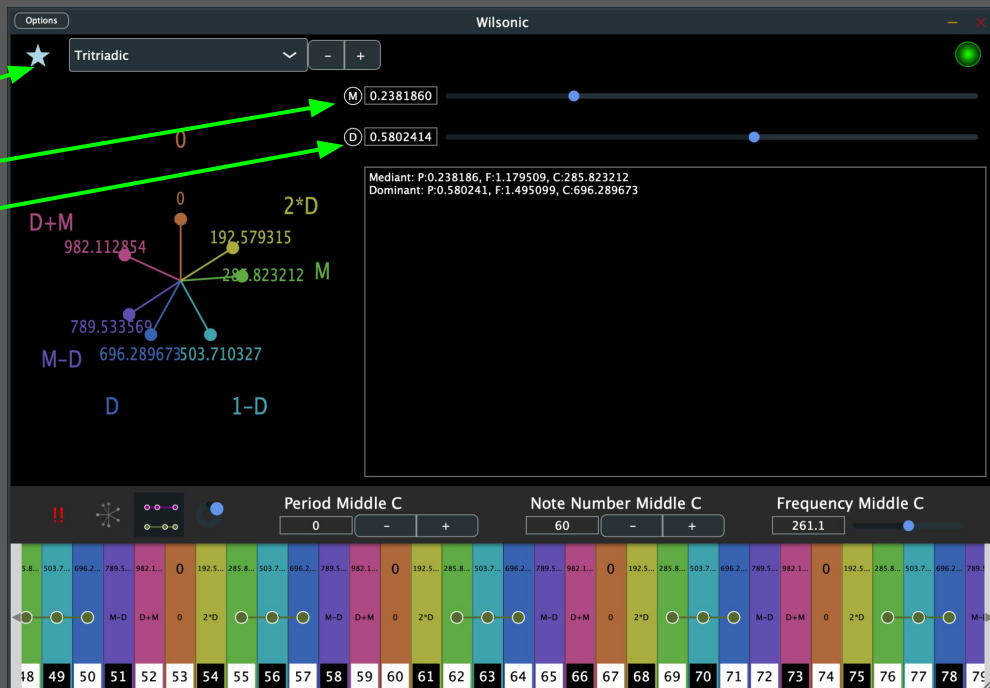
Tritriads are very simple and are based on the major scale as a template. They are defined as three triads composed of a tonic, mediant and dominant interval. Let us set the tonic to 0 [in Cents], then the basic triad has the form 0, M, D. By adding a subdominant triad 1200-D, M-D, 1200 and a dominant triad, D, D+M 2*D, one gets the notes in ascending order 0 2*D M 1200-D D M-D D+M 1200 for an octave spanning scale. In ET, 0 and 1200 are the same note an octave apart, in JI 1/1 and 2/1 have the same harmonic function.

They are also definable in JI—take any triad such as 4:5:6 and write it as 1/1 5/4 3/2. The subdominant is the octave-adjusted triad obtained by dividing by D (=3/2) or more conveniently as 4/3 5/3 2/1. The dominant triad is the tonic multiplied by the dominant interval. This operation yields 3/2, 15/8 and 9/8. Hence the three triads are 4/3 5/3 2/1, 1/1 5/4 3/2, and 3/2 15/8 9/8 (when reduced to the same octave. Symbolically written as 2/D M/D 2/1, 1/1 M D, D D*M D^2 or in ascending order 1/1 D^2 M 2/D D M/D D*M 2/1—1/1 9/8 5/4 4/3 5/3 15/8 2/1.

In both cases there are two supplementary triads which I refer to as conjugate triads—M D D+M and M-D 1200 M. These have the form of 0 D-M D or in the JI case, 5/4 3/2 15/8 and 5/3 2/1 5/4, to be reduced to the same octave. Major and minor or more generally prime and conjugate are thus conjugates of each other

Any triad may be used—4:5:6, 4:5:7 or even irrational numbers.

—John Chalmers, May 4, 2022



Scala File Support

- Hover over status label for status history

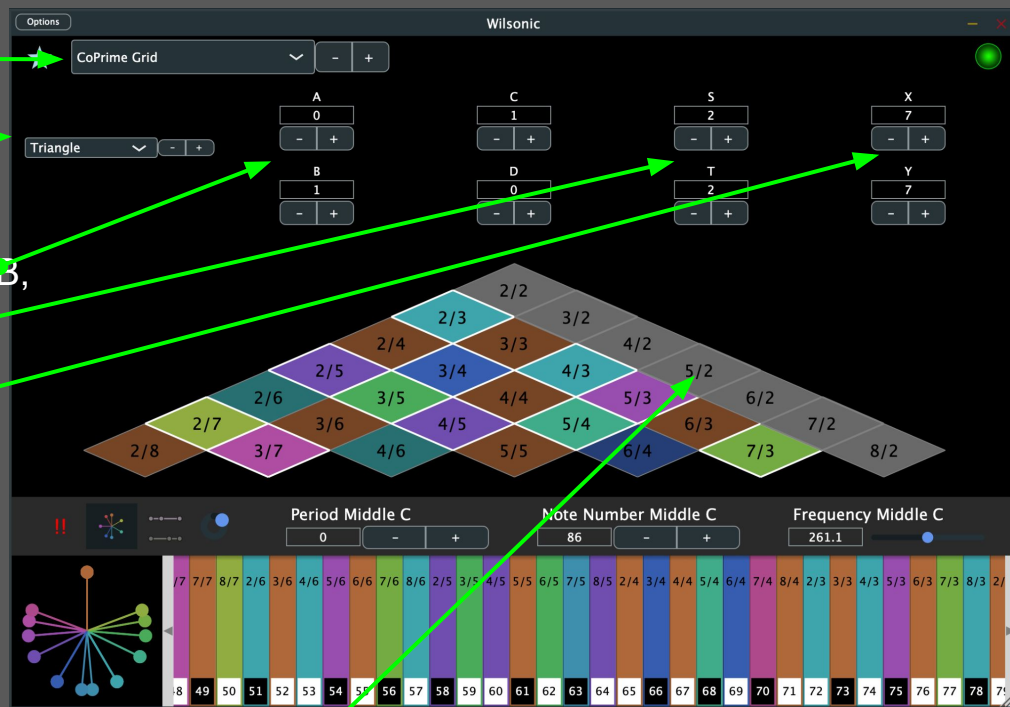
- Select “Scala” from the Scale Design menu
- Select “Bundled” or “User”
- Highlight the row and hit RETURN to tune up the Microtonal Keyboard
- Supports non-Octave tunings
- Mouse-Hover over the row to see the contents of the Scala file
- Only when “User” is selected can you import/delete .scl files:
 - Drag-and-Drop files into the window
 - Click on the “+” for a File Browser
 - Select-Backspace to DELETE
- When “Bundled” is selected:
 - 5,100+ .scl files (read-only)
 - Please see [Huygens-Fokker Centre for Microtonal Music](#)
 - Shoutout Manuel op De Coull!
- User/Bundled is automatable
- User and Bundled IDs are automatable
- You can “Favorite” Scala files

The screenshot shows the Wilsonic software interface. At the top, there are controls for "Options", "Scala" (with a dropdown menu), and "Bundled" (with a dropdown menu). A table lists Scala files with columns for ID, Icon, scl, Period, and NPO. A tooltip is visible over the row for ID 277, showing "Selected bundled Scala file ID: 277". Below the table, there are controls for "Period Middle C" (0), "Note Number Middle C" (60), and "Frequency Middle C" (261.625580). At the bottom, a microtonal keyboard is shown with a circular scale diagram on the left and a piano roll on the right.

ID	Icon	scl	Period	NPO
277		seventeentosixteen.scl	2.0	
278		diat25.scl	2.0	
279		carlos_super.scl	2.0	
280		parizek_epi2a.scl	2.0	
281		valentine.scl	2.0	
282		ushshaq_tetrachord_11-limit.scl	1.333333373069763	
283		kacapi2.scl	2.009263277053833	5
284		liu_minor.scl	2.0	7
285		diat31.scl	2.0	8
286		singapore_coh.scl	2.0	7
287		deka6144.scl	2.0	20

CoPrime Grid

- Select “[CoPrime Grid](#)” from the Scale Design menu
- Select “Harmonic”, “Triangle”, or “Subharmonic”. Same tones, just different layout
- [Reseed](#) the CoPrime Grid by modifying A, B, C, D.
- Offset by modifying S and T*
- Expand/Reduce number of terms by modifying X and Y
- Touchscreens: You can play the geometry as a keyboard!
- Best played on a 2-d keyboard such as the Linnstrument
- See Erv’s CoPrime designs on Kraig Grady’s [Anaphoria website](#) for more details on the construction and properties of this remarkable object



If a note is greyed out it means there is no midi note assigned to it. Use “Note Number Middle C” to lower the root note to get the notes in range

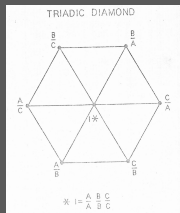
* Wilson allowed for S and T to be zero in the construction of the

Diamonds: Reciprocal Cross-Sets

- Rows are the harmonic series of the master set
- Columns are the subharmonic series of the master set
 - Row 0 = Harmonic series divided by A
 - Column 0 = Subharmonic series multiplied by A
 - Diagonal = 1/1

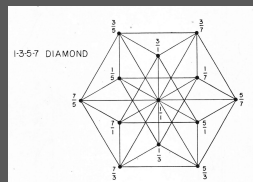
Triadic

_one	B/A	C/A
A/B	_one	C/B
A/C	B/C	_one



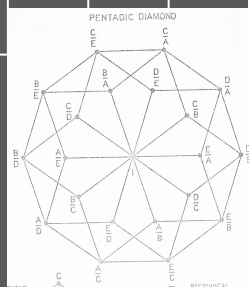
Tetradic

_one	B/A	C/A	D/A
A/B	_one	C/B	D/B
A/C	B/C	_one	D/C
A/D	B/D	C/D	_one



Pentadic

_one	B/A	C/A	D/A	E/A
A/B	_one	C/B	D/B	E/B
A/C	B/C	_one	D/C	E/C
A/D	B/D	C/D	_one	E/D
A/E	B/E	C/E	D/E	_one



Ogdoadic

_one	B/A	C/A	D/A	E/A	F/A	G/A	H/A
A/B	_one	C/B	D/B	E/B	F/B	G/B	H/B
A/C	B/C	_one	D/C	E/C	F/C	G/C	H/C
A/D	B/D	C/D	_one	E/D	F/D	G/D	H/D
A/E	B/E	C/E	D/E	_one	F/E	G/E	H/E
A/F	B/F	C/F	D/F	E/F	_one	G/F	H/F
A/G	B/G	C/G	D/G	E/G	F/G	_one	H/G
A/H	B/H	C/H	D/H	E/H	F/H	G/H	_one

