

Periodic Table: A New Perspective

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Objective:

Better data visualization to aid those not familiar with nuclear data using the more familiar periodic table

- Couple periodic table with chart of the nuclides
- Bring tactile experience to a static chart

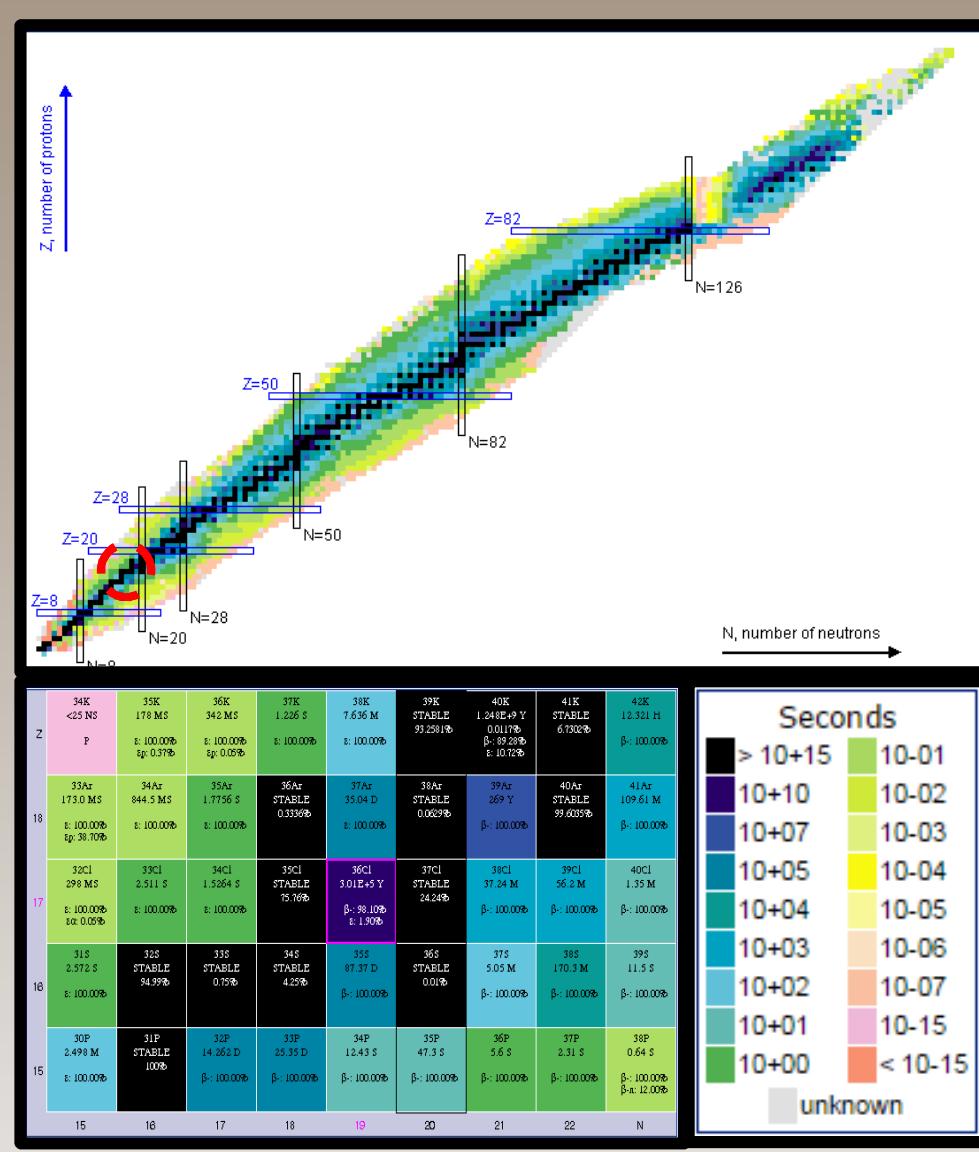
Development:

- Identify two different tactile experience to convey information
 - Upwords
 - Tic Tac Toe
- Identify isotopes to use in combined chart
- Categorize by half life
- CAD models of each method

Future Work:

- Further isotopic information
- Construct the physical displays for each method

Coupling the modern periodic table to the chart of the nuclides to bring a tactile aspect to a static chart.



4
Be

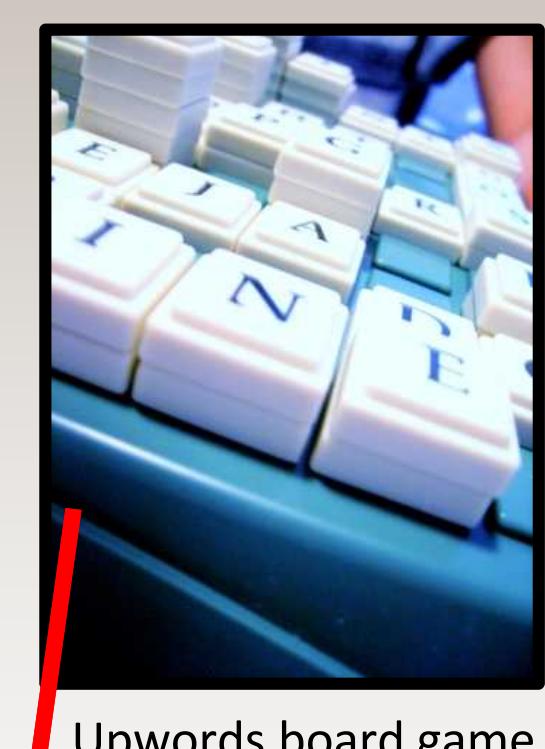
Typical element tile with atomic number and symbol

| Group → 1 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | |
|-------------|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|---------|-------|-------|-------|
| 1 Period | | 1 H | 2 He | 3 Li | 4 Be | 5 B | 6 C | 7 N | 8 O | 9 F | 10 Ne | 11 Na | 12 Mg | 13 Al | 14 Si | 15 P | 16 S | 17 Cl | 18 Ar |
| 2 | | 19 K | 20 Ca | 21 Sc | 22 Ti | 23 V | 24 Cr | 25 Mn | 26 Fe | 27 Co | 28 Ni | 29 Cu | 30 Zn | 31 Ga | 32 Ge | 33 As | 34 Se | 35 Br | 36 Kr |
| 3 | | 37 Rb | 38 Sr | 39 Y | 40 Zr | 41 Nb | 42 Mo | 43 Tc | 44 Ru | 45 Pd | 46 Ag | 47 Cd | 48 In | 49 Sn | 50 Pb | 51 Sb | 52 Te | 53 Xe | 54 Rn |
| 4 | | 55 Cs | 56 Ba | 57 Hf | 72 Ta | 73 W | 75 Re | 77 Os | 78 Pt | 79 Au | 80 Hg | 81 Tl | 82 Pb | 83 Bi | 84 Po | 85 At | 86 Rn | 87 Fr | 88 Ra |
| 5 | | 104 Fr | 105 Rf | 106 Db | 107 Sg | 108 Bh | 109 Mt | 110 Ds | 111 Rg | 112 Cn | 113 Ut | 114 Fl | 115 Lv | 116 Uus | 117 Lu | 118 Uuu | | | |
| 6 | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | |
| Lanthanides | | 57 La | 58 Ce | 59 Pr | 60 Nd | 61 Pm | 62 Eu | 63 Sm | 64 Gd | 65 Tb | 66 Dy | 67 Ho | 68 Er | 69 Tm | 70 Lu | 71 Yb | | | |
| Actinides | | 89 Ac | 90 Th | 91 Pa | 92 U | 93 Np | 94 Am | 95 Cm | 96 Bk | 97 Cf | 98 Es | 99 Fm | 100 Md | 101 No | 102 Lr | | | | |

Modern periodic table

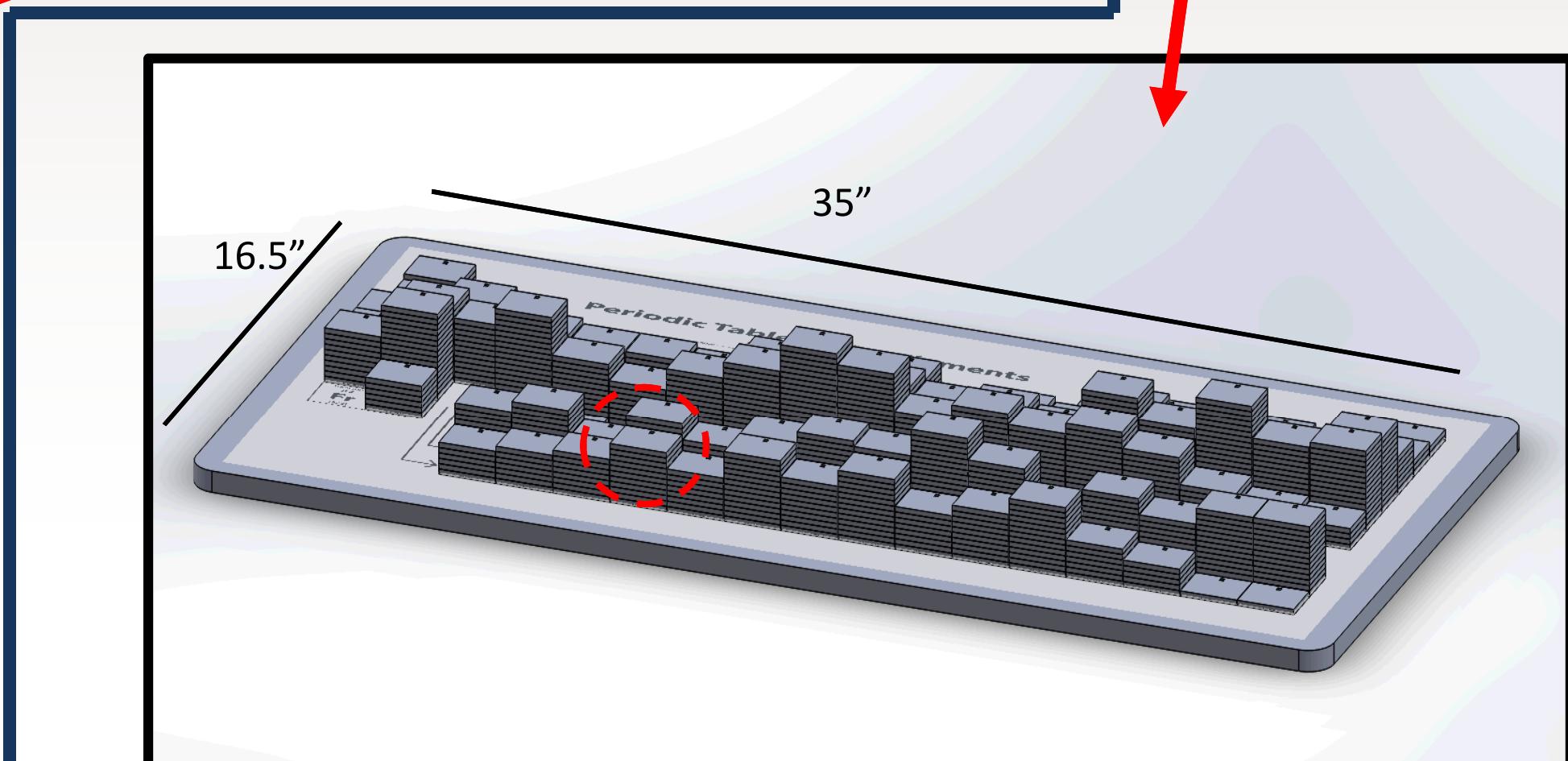


Playground tic tac toe

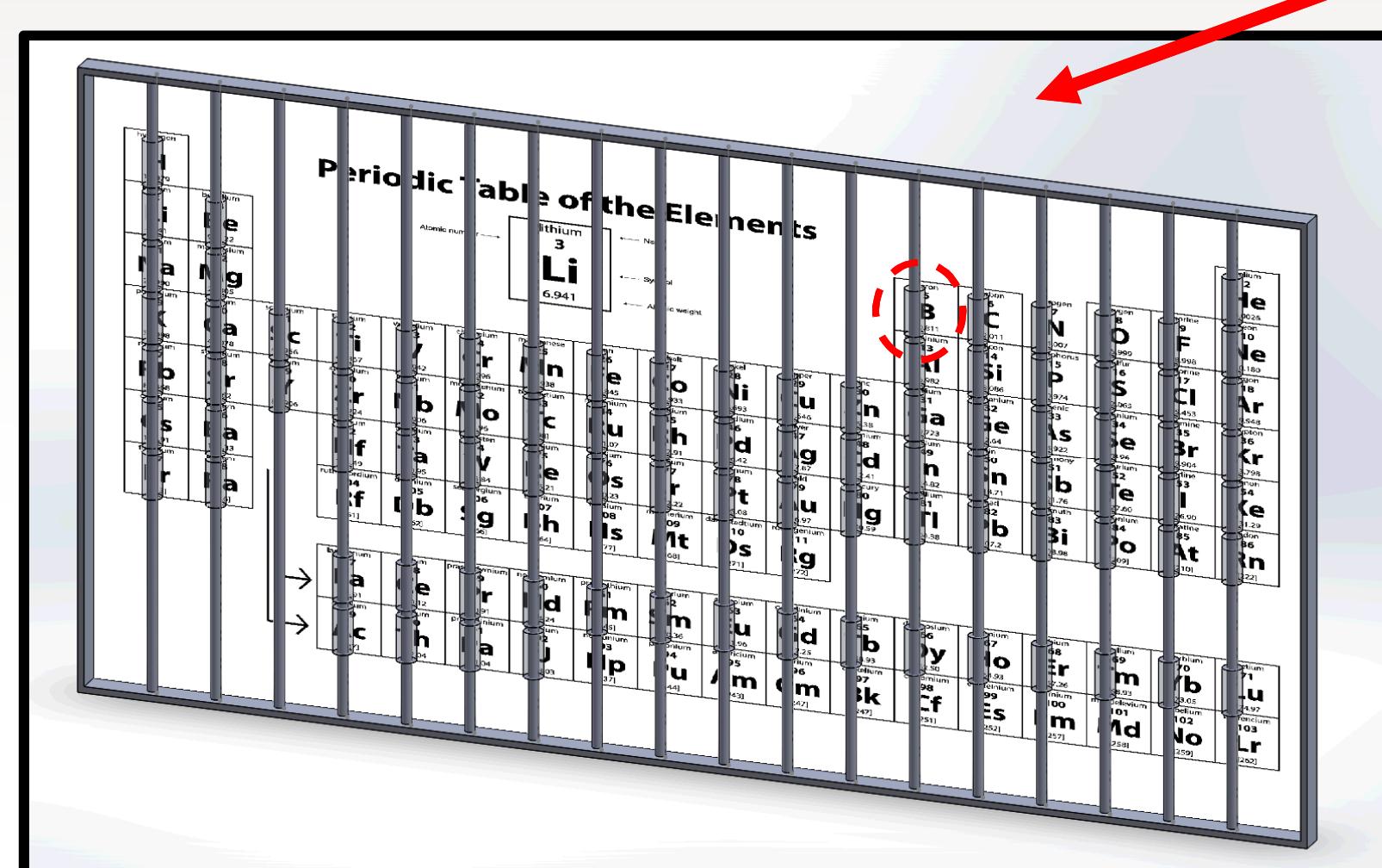


Upwords board game

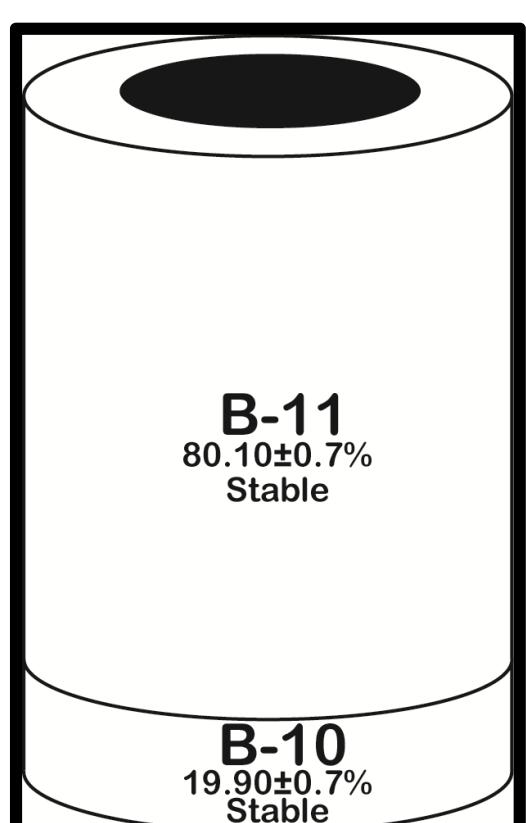
Chart of the nuclides with zoomed in view



Current tile stacking CAD model



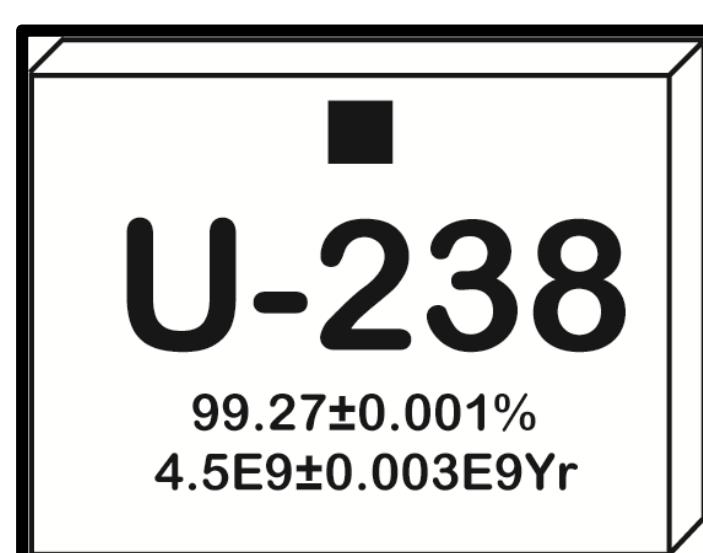
Current cylinder rotation CAD model



Example elemental cylinder containing all available isotopes of boron with abundance and half life

| Time scale | | | |
|------------------|--|--|--|
| < 5e10yr | | | |
| >5e10yr - 5e15yr | | | |
| >5e15yr - 5e20yr | | | |
| >5e20yr -stable | | | |

Color coded half life categories for future physical cylinder labels



Example isotope tile containing abundance and half life

| Time scale | |
|------------------|--|
| 1hr - 1 day | |
| >1day - 20day | |
| >20day-1yr | |
| >1yr-1e2yr | |
| >1e2yr - 1e4yr | |
| >1e4yr-1e10yr | |
| >1e10yr - 1e20yr | |
| >1e20yr-stable | |

Color coded half life categories for future physical tiles

These two new approaches present the periodic table in a way that also includes isotopic abundances, lifetimes and in the future decay modes.

Thank you to Matthew Armijo and Richard Sisson for their help so far through this project, Khalid Hattar for his guidance and suggestions, and Carley Parriott and Dan Perry for their assistance getting supplies