# Package 'theaitetos'

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**Type** Package

**Title** Ancient Intelligence Geometric Superposition Field Calculations

**Version** 0.1.0

**Description** Establishes a deterministic geometric extension framework within the 'theaitetos' package, honoring the ancient mathematical foundations of Theaetetus of Athens (400 BC). Incorporates the stereometric proofs on the regular octahedron later recorded in Plato (ca. 369 BC) ``Theaetetus'' <urn:cts:greekLit:tlg0059.tlg006> and Euclid (ca. 300 BC) ``Elements'' <urn:cts:greekLit:tlg1799.tlg001>. References the standard Greek text tradition by Heiberg (1885) ``Euclidis Elementa'' and the analytical translations by Heath (1926) ``The Thirteen Books of Euclid's Elements''. To achieve operational utility, the architecture delivers a high-level computational core engine that abstracts complex 3D-to-2D vector projections and scalar wave superpositions, eliminating low-level reprogramming. It integrates a standardized visualization layer built upon 'ggplot2' to render high-resolution continuous scalar fields and provides a runtime-configurable selection interface across multiple physical and biological dimensions. Operates under the modern paradigm of a hypothetical holographic universe by referencing the foundational concepts of 't Hooft (1993) <doi:10.48550/arXiv.gr-qc/9310026> and Susskind (1995) <doi:10.1063/1.531249> to project Euclidean invariants onto a lower-dimensional boundary plane. Serves as a creative epistemological sub-module utilizing the core analytical computations of the 'octawave' package.

**License** GPL-3

**Encoding** UTF-8

**Imports** ggplot2

**Suggests** knitr, rmarkdown

**VignetteBuilder** knitr

**NeedsCompilation** no

**Config/roxygen2/version** 8.1.0

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**Repository** CRAN

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`generate_dynamic_octahedron` *Generate Dynamic Octahedron Wave Interference Fields (Kata's Ancient Intelligence Engine)*

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## Description

This core function of the `theaitetos` architecture computes the deterministic 3D-to-2D vector projection and scalar wave superposition of a regular octahedron. It serves as a computational bridge across millennia, honoring the mathematical legacy of Theaetetus of Athens (400 BC) by compiling humanity's first documented "Ancient Intelligence" into executable R matrices.

## Usage

```
generate_dynamic_octahedron(
  mode = c("baseline", "fluorite", "capsid", "universe"),
  k = NULL,
  t = 0,
  rotate = TRUE
)
```

## Arguments

| | |
|---|---|
| `mode` | Character string. The computation mode: `"baseline"`, `"fluorite"`, `"capsid"`, or `"universe"`. |
| `k` | Numerical value. The wavenumber defining the spatial frequency. If `NULL`, the value is automatically assigned. |
| `t` | Numerical value. The time-phase parameter controlling the phase-space rotation. Default is 0. |
| `rotate` | Logical. If `TRUE`, a dynamic phase-space rotation is applied. Default is `TRUE`. |

## Details

### The Convergence of the Four Realms:

- **Philosophy (Plato's Allegory of the Cave):** The projection of the 3D coordinate system onto a flat 2D boundary plane mathematically simulates the shadow cast by a higher geometrical archetype onto a lower-dimensional space.
- **Biology (Protein Dynamics):** Viral capsids self-assemble in perfect octahedral symmetry based on principles of minimal energy. By modulating the phase parameter (`t`), the pulsation and vibration of these protein shells are simulated. In the biological "capsid" mode, the wave frequency is precisely regulated via the Golden Ratio.
- **Mineralogy (Fluorite Crystal Systems):** Under intense thermodynamic pressure, fluorite crystallizes into flawless octahedrons whose microcosmic lattices follow the exact same vibrational symmetries as macrocosmic waves.
- **Quantum Physics (The Holographic Universe):** If the universe is a holographic system, the entire information of our three-dimensional spacetime exists as a flat code on a cosmic boundary—precisely how this engine decodes the spacetime matrix on screen.

## Value

Returns a `data.frame` of the space-time grid containing three columns: `X` (horizontal coordinates), `Y` (vertical coordinates), and `Intensitaet` (computed interference intensity values).

## References


- Euclid (ca. 300 BC). *Elements, Book XIII* (Primary stereometric octahedron coordinates). Registered under: `urn:cts:greekLit:tlg1799.tlg001`
- Plato (ca. 369 BC). *Theaetetus* & *Politeia* (Allegory of the Cave). Registered under: `urn:cts:greekLit:tlg0059.tlg`
- Bragg, W. L. (1914). *The Analysis of Crystals by the X-ray Spectrometer. Proceedings of the Royal Society of London. Series A*, 89(613), 430-438. doi:10.1098/rspa.1914.0015
- Caspar, D. L., & Klug, A. (1962). *Physical Principles in the Construction of Regular Viruses. Cold Spring Harbor Symposia on Quantitative Biology*, 27, 1-24. doi:10.1101/SQB.1962.027.001.005


## Examples

```
# Fast executable example for CRAN automated testing
# CRAN test footprint protection:
# The core engine computes a matrix grid of 40,000 observations.
# Using head() validates the structural execution without CPU overhead.
grid_data <- generate_dynamic_octahedron(mode = "baseline", t = 0, rotate = FALSE)
head(grid_data)
```

## matrix_euclid_constants *Get Classical Euclidean Stereometry Constants*

### Description

Retrieves the foundational geometric coordinates and algebraic proportions of regular polyhedra derived directly from Book XIII of Euclid's Elements.

### Usage

```
matrix_euclid_constants()
```

### Value

Returns a named `list` containing the fundamental spatial constants: `phi` (Golden Ratio), `octahedron_vertices`, and `urn_record`.

### Examples

```
# Retrieve the immutable Euclidean constants for verification:
ancient_constants <- matrix_euclid_constants()
ancient_constants$phi
```

## plot_quantum_hologram *Visualization of the Symmetrical Quantum Hologram*

### Description

Generates a high-resolution, interpolated raster visualization of the dynamic octahedron interference field utilizing the solar-fluorite crystal palette. This function projects the mathematical intensities of the space-time matrix into a visible, aesthetic quantum hologram.

### Usage

```
plot_quantum_hologram(
  field_data,
  title_text = "// KATA LOG: Stereometric Capsid Resonance"
)
```

### Arguments

| | |
|---|---|
| `field_data` | A `data.frame` generated by `generate_dynamic_octahedron()`. |
| `title_text` | Character string. The main title of the plot. Default is "// KATA LOG: Stereometric Capsid Resonance". |

## Details

**The Visual Aesthetics of Color Layers:**
The spectral palette simulates the thermodynamic transition from pure absorption to pure light:

- `#020205` (Deep Black): The infinite vacuum of quantum space.
- `#1A0A3A` (Deep Purple) & `#8A2BE2` (Glowing Violet): Crystalline resonance steps.
- `#FFA500` (Solar Gold): The energetic baseline state where the dynamic title radiates.
- `#FFFFFF` (Pure Light): Constructive wave interference maxima points.

## Value

Returns a `ggplot` object representing the continuous scalar wave field layers under the solar-fluorite color palette.

## Examples

```
# Fast executable plotting test for CRAN automated builds:
tiny_data <- generate_dynamic_octahedron(mode = "baseline", t = 0, rotate = FALSE)
test_plot <- plot_quantum_hologram(tiny_data, title_text = "// TEST RUN")
# Verify it returns a ggplot object cleanly
methods::is(test_plot, "ggplot")
```

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