

# User Manual 3.4.1 Ellipsoids

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### Definition

An ellipsoid is a closed quadric surface that is the three dimensional analogue of an ellipse. Assuming the XYZ coordinate system is such that the ellipsoid is centered and axis-aligned, the ellipsoids equation is given by:

$$\left\{ (x, y, z) \in \mathbb{R}^3 \mid \frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 \right\}$$



**a**, **b** and **c** are called the semi axes of the ellipsoid.

### Implementation

The Ellipsoid object in the SIRIUS library implements the [MAT\_GEO\_EllipsoidInterface Ellipsoid interface]. Please refer to the [Javadoc](#) for a complete list of public methods.

### Instantiation

In order to instantiate an ellipsoid, the user must specify the ellipsoids' center, it's axis of revolution, X-axis, and all three semi-axis [math]a, [math>b] and [math>c]. For example :

```
// Spheroid parameters
Vector3D position = new Vector3D(0, 0, 0);
Vector3D revAxis = new Vector3D(0, 0, 1);
Vector3D xAxis = new Vector3D(1, 0, 0);
double a = 2.0;
double b = 1.5;
double c = 1.0;
// The ellipsoid itself
Ellipsoid myEllipsoid = new Ellipsoid(position, revAxis, xAxis, a, b, c);
```

### Usage

Please refer to the [MAT\_GEO\_Home#HInteractions Interactions with other geometrical objects section] for methods inherited from the Shape interface.

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