

# Main differences between V4.13 and V4.12

De Wiki

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**PATRIUS** V4.13 is a major release adding some new features and correcting some bugs.

## New functionalities

- Celestial bodies and barycenters are now differentiated: celestial bodies are represented by the interface `CelestialBody` and barycenters are represented by the interface `CelestialPoint`. `CelestialBody` describes, besides the attributes of `CelestialPoint`, a `GravityModel`, an `IAUPole` and a `BodyShape`. The EMB and SSB objects are now built as `CelestialPoint`.
- Add the Ecliptic\_J2000 frame, accessible from `FramesFactory.getEclipticJ2000()`. Every `CelestialPoint` objects has a Ecliptic\_J2000 frame defined in its center.
- Add the G50 frame, accessible from `FramesFactory.getG50()`.
- A celestial body orientation can now be defined with quaternions. This evolution adds the interfaces `CelestialBodyOrientation` and `CelestialBodyIAUOrientation` (`IAUPole` renamed) and the class `CelestialBodyTabulatedOrientation`.
- Add a generic filter method in the interface `EventDetector` (already applied for `LocalTimeAngleDetector`)
- Merge the eclipse and lightning ratio computation between `EclipseDetector` and `SolarRadiationPressure`.
- The obliquity and precession model of the Earth (used for the MOD reference frame) has been made configurable through the configuration of reference frames:
  - Add the interface `MODPrecessionModel` and one implementation `IAUMODPrecessionModel`
  - Add getters/setters in the frames configuration
- Add the `SurfaceDistanceDetector` detector allowing to detect the distance at the surface of a celestial body (ellipsoid, facet body, etc).
- Add the class `ThreeAxisEllipsoid` allowing to represent a 3-axis ellipsoid. This class extends `EllipsoidBodyShape`.
- Add the `DatePolynomialFunctionInterface#copy(AbsoluteDate newOriginDate)` method, allowing to instantiate a new equivalent polynomial function at a different T0 date.
- `PotentialCoefficientsReader` can now read gravity model sigmas
- New `SignalPropagationWrapperDetector` allowing to wrap existing compatible detectors and extract signal emitter and/or receiver dates associated to an event.
- Add new methods in `RealMatrix` : `double getMin(boolean absValue)`, `double getMax(boolean absValue)` and `RealMatrix getAbs()`
- Add new matrix NUMPY\_FORMAT format in `MatrixUtils` + new features
- `AngularCorrection` extends `IParameterizable`
- Standard parameters in `MeteorologicalConditions` are public + a STANDARD pre-build instance is accessible
- `FiniteDistanceAngularCorrection` : new interface allows characterizing an angular correction when the distance between the observer and the target is finite (to account for parallax correction, for example).
- `AstronomicalRefractionModel` : new class to represent a troposphere refraction model. The new `AstronomicalRefractionModelFactory` class facilitate its usage.
- `VacuumSignalPropagation` : new `getEmitterPV` & `getReceiverPV` methods + define the internal enumerate `SignalPropagationRole` to dissociate the role of transmitter or receiver.

- IntervalMapSearcher : new class allowing to associate objects to date intervals with an optimized cache management.
- CardanCalculator : new class similar to AzimuthElevationCalculator, describing static computational methods for the Cardan angles.
- ZernikePolynomial : new class to represent a Zernike polynomial
- LightAberrationCorrection : new class replacing StellarAberrationCorrection

## Bugs fixes

- LongitudeDetector : the  $2\pi \rightarrow 0$  jump is fixed
- Existing informatic formats for matrix representation in MatrixUtils (JAVA, OCTAVE, SCILAB, NUMPY) now display all the digits
- The use of BSP files for celestial bodies has been made more robust.
- The PyramidalField union calculation is more robust in certain configurations.
- "FieldDescriptor: The printFunction parameter becomes serializable.

Récupérée de

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