KerrNullGeoDistantFunction

KerrNullGeoDistantFunction[*a*, *θo*, *α*, *β*, *assoc*]
an object for storing the trajectory and its parameters in the *assoc* Association.

This object is returned by the KerrNullGeoDistant function.

The object contains an association accessible in a regular fashion through square brackets containing a key KerrNullGeoDistantFunction["Key"]. If the argument given in the square brackets is not a string, it is assumed to be the Mino time and returns the coordinate value at that time.

The following keys are accepted:

"Trajectory"	Returns a list of trajectory coordinates {Δv, r, *θ*, *φ*} as functions of the Mino time *λ*.
"ConstantsOfMotion"	Returns a list of the constants of motion of the geodesic {*l*, *η*}.
"RadialRoots"	Returns the radial roots in a list {r1, r2, r3, r4}, as are defined in Gralla & Lupsasca, arXiv:1910.12881v3.
"EquatorIntersectionMinoTimes"	Returns the Mino times when *θ*=*π*/2 in a list from smallest (closest to the observer to largest.
"EquatorIntersectionCoordinates"	Returns the coordinates {Δv, r, *φ*} at "EquatorIntersectionMinoTimes".
"ShellIntersectionMinoTime"	Returns the Mino time when the geodesic of the type "PhotonEscape" crosses the radius given by *shellRadius* at the higher Mino time (further from the observer).
"ShellIntersectionCoordinates"	Returns the coordinates {*θ*, *ϕ*, Δv} at "ShellIntersectionMinoTime".
"TrajectoryType"	Returns one of the following trajectory types: "PhotonCapture" if the trajectory crosses the horizon, or else "PhotonEscape".
"MinoTimeOfCapture"	Returns the Mino time,when the photon crosses the outer horizon if "TrajectoryType" is "PhotonCapture", or the Mino time when the photon scatters back to infinity.
"EscapeCoordinates"	If "TrajectoryType" is "PhotonEscape", returns the {*θ*, *φ*} coordinates in "MinoTimeOfCapture", otherwise returns {−1, −1}.
"EmissionCoordinates"	If the trajectory crosses the equatorial plane at some r>rISCO, returns a list of coordinates at the first occurrence.
"EmissionParameters"	If the trajectory crosses the equatorial plane at some r>rISCO, at the first occurrence returns a list {*κ*, *θ*loc, *φ*loc} defined as the ratio between energy at infinity and the locally measured energy on a circular equatorial geodesic, and the locally measured impact angles respectively. Otherwise returns {−1, −1, −1}.

Tech Notes

KerrNullGeodesics

Related Links

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See Also

KerrNullGeoDistant ▪ **KerrNullGeoFunction** ▪ ⊕

Related Guides

KerrNullGeodesics

Examples Initialization

```
Needs["BlackHoleImages`"]
```

Basic Examples

More Examples ▹

Compute a geodesic in geometry given by $a = 0.6$, with the initial values $\theta = \pi/3$, $\alpha = 6$, $\beta = 7$ using the KerrNullGeoDistant function:

```
In[21]:= geod = KerrNullGeoDistant[0.6, π / 3, 6, 7];
```

Access the constant of motion ℓ and the escape coordinates $\theta\infty$, $\phi\infty$:

```
In[22]:= ℓ = geod["ConstantsOfMotion"]["ℓ"]
         {θ∞, ϕ∞} = geod["EscapeCoordinates"]
Out[22]= -3 √3
Out[23]= {2.52403, -3.96582}
```

Get the Boyer-Lindquist coordinates at Mino time λ=0.1:

```
In[24]:= geod[0.1]
Out[24]= {4.90212, 11.3013, 0.598116, -1.16209}
```

More Examples

- Scope
- Generalizations & Extensions
- Options
- XXXX
- XXXX
- Applications
- Properties & Relations
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- Interactive Examples
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Metadata

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Categorization

Keywords

Syntax Templates