Caracterización de supercúmulos en simulaciones cosmológicas

CoCo 2019 : Cosmología en Colombia

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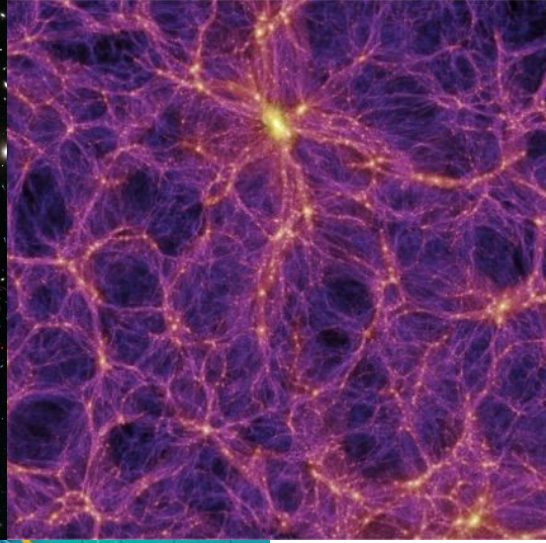
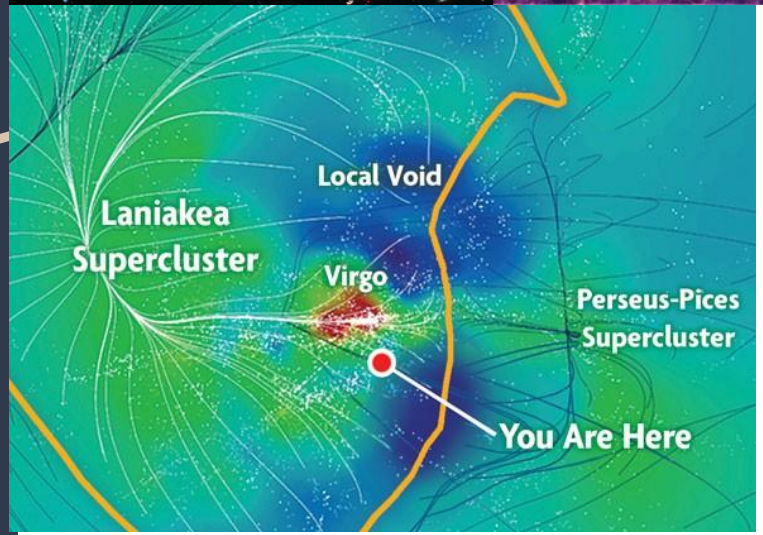
Introducción

- (1932) Shapley & Ames
- 1249 Galaxias (Cúmulos)
- Estructuras cosmológicas
- Supercúmulos
- Supercúmulo local
- fluctuaciones primordiales
- Simulaciones de N-cuerpos con tiempo para evolucionar.





Análisis inicial

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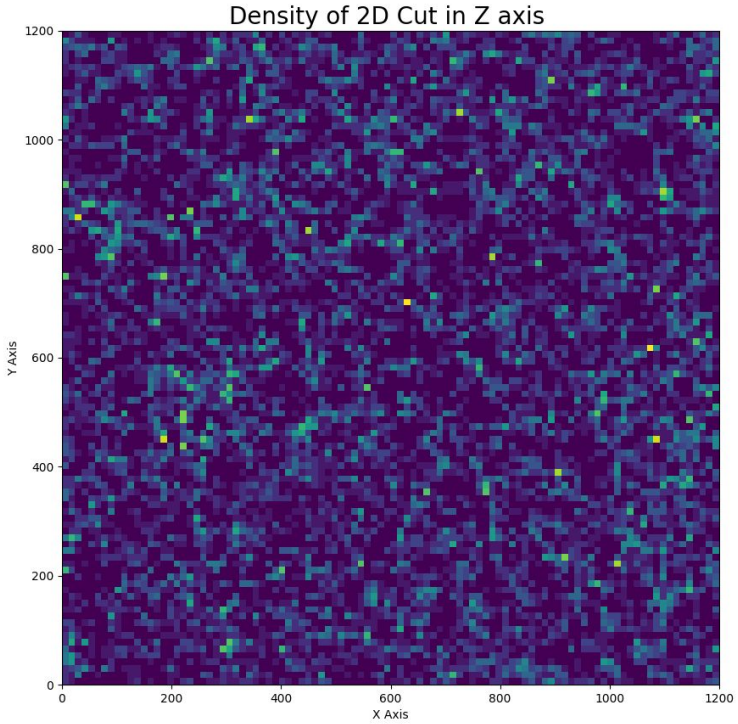
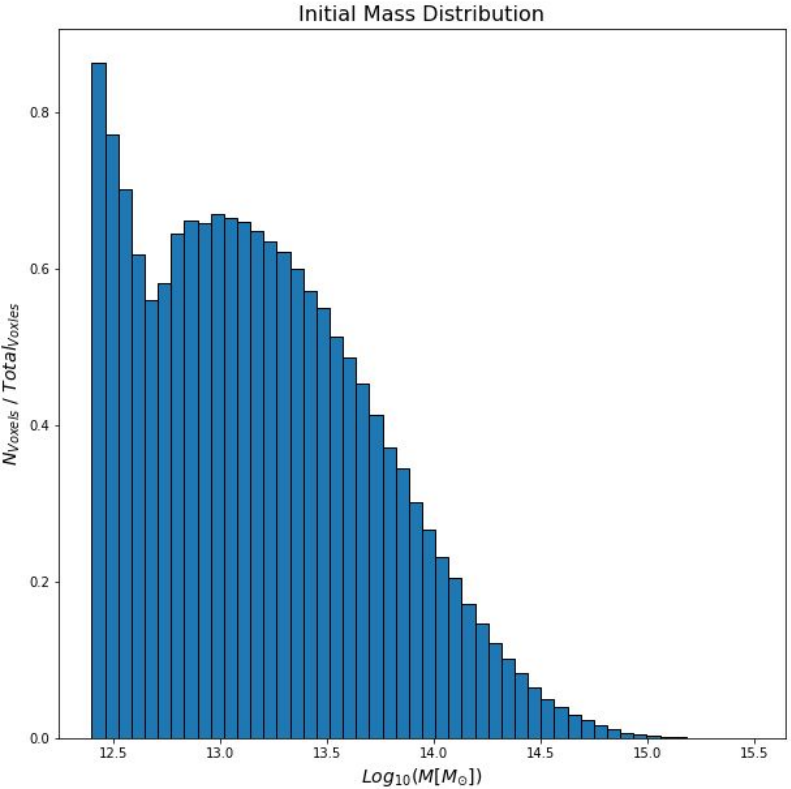
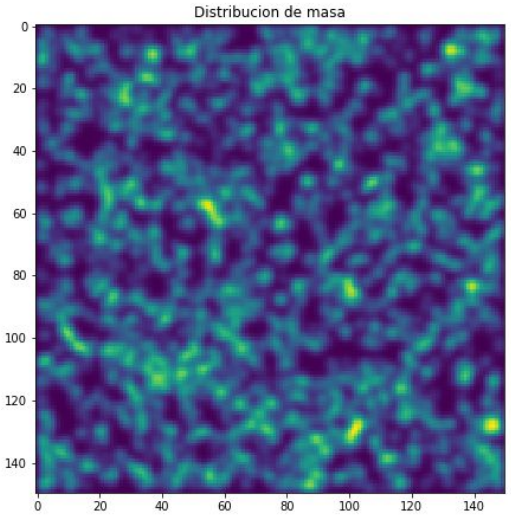
Condiciones iniciales

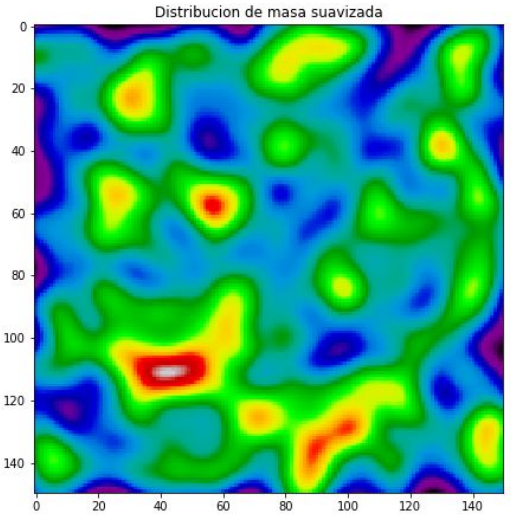
- Hay ~**$2x10^6$ Halos** en un volumen de ~**1.73×10^9 Mpc/h^3**
- Se tiene **[x , y , z] , [Vx , Vy , Vz] , [Mbound] .**
- Se divide el espacio en una grilla
- *Simulaciones de N-cuerpos acceso público.*

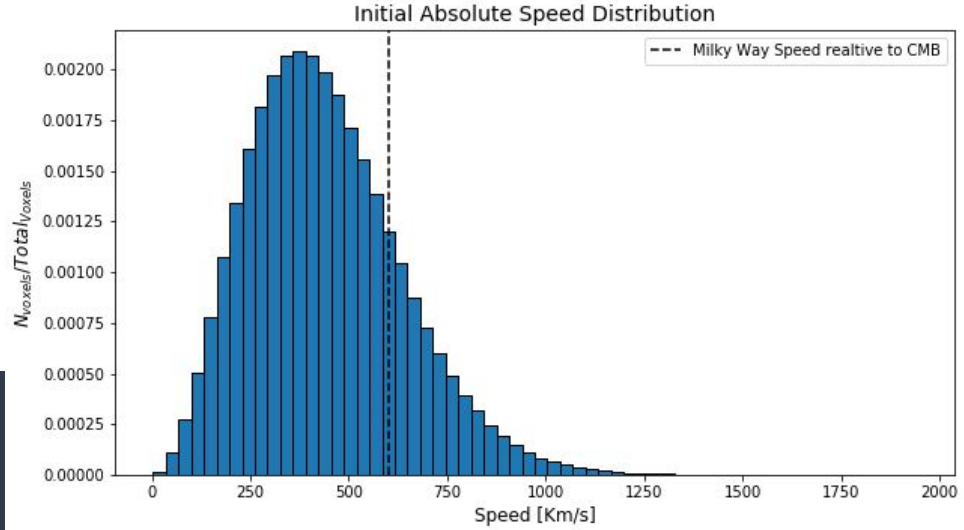


SUAVIZADO GAUSSIANO









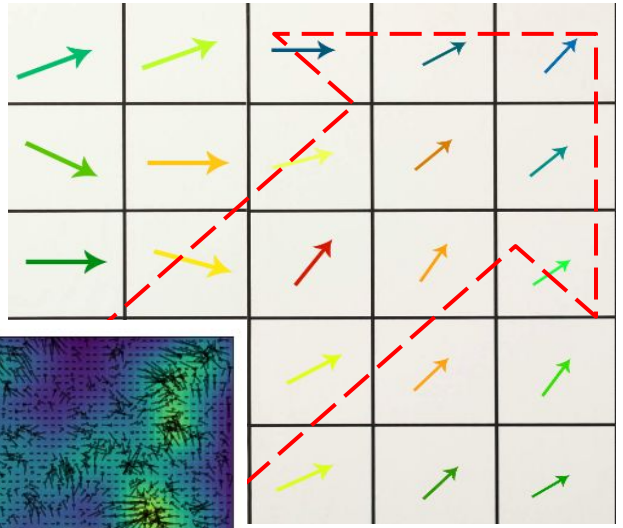
Análisis inicial

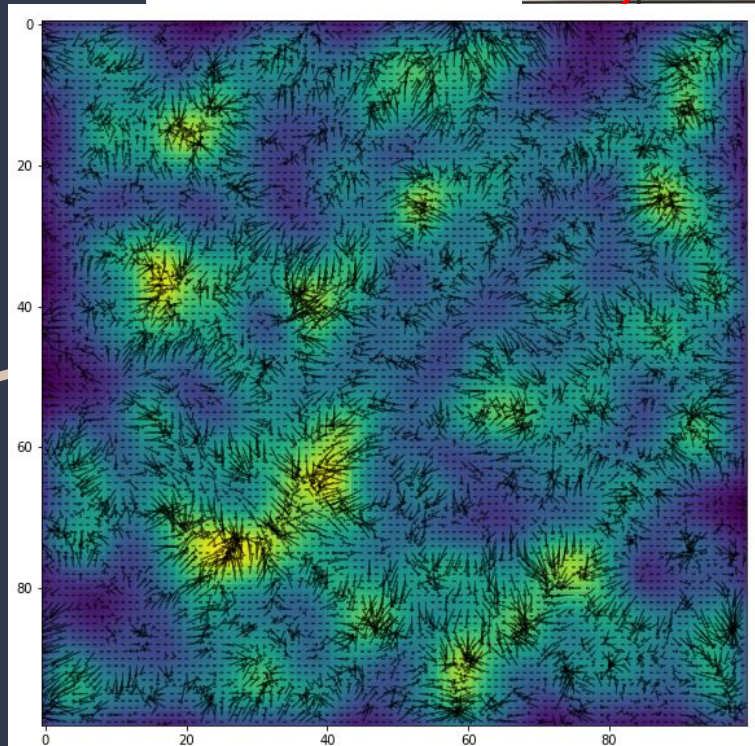
Flujo de velocidad

construyendo el VDC

- Se consigue una grilla 3D de velocidades para cada dimensión de movimiento (x , y , z)
- Se quieren caracterizar supercúmulos por su acreción.
- Características de **GRUPO.**

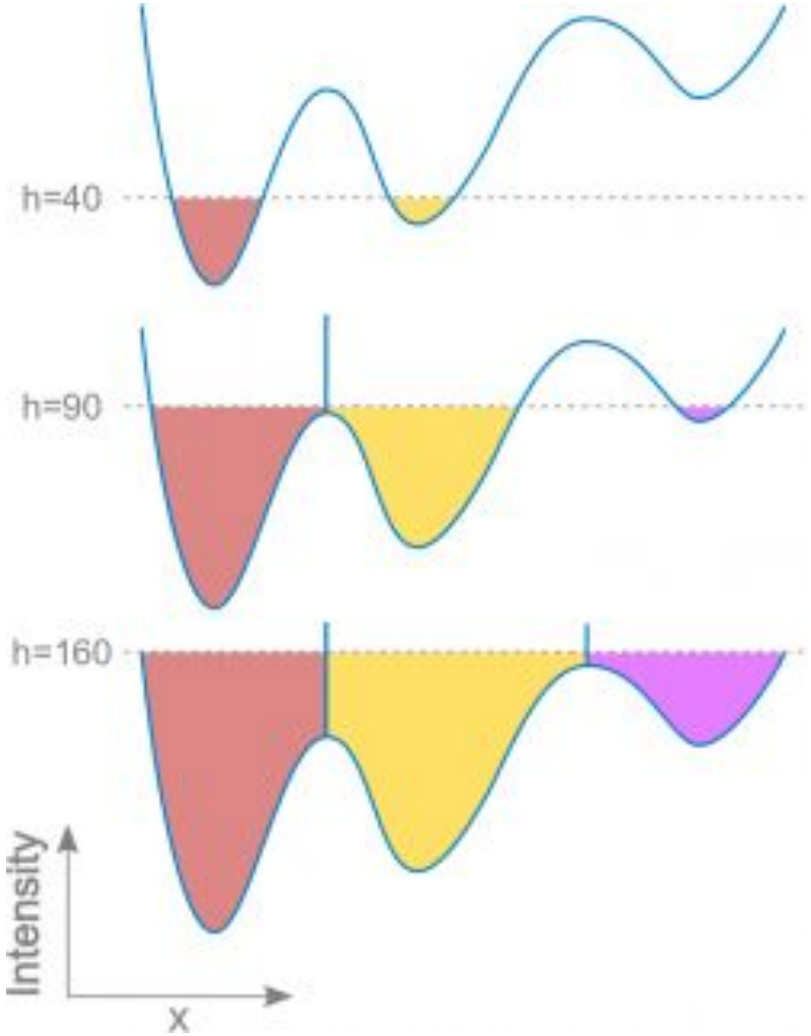
$$\nabla \cdot \vec{\mathbf{v}}$$



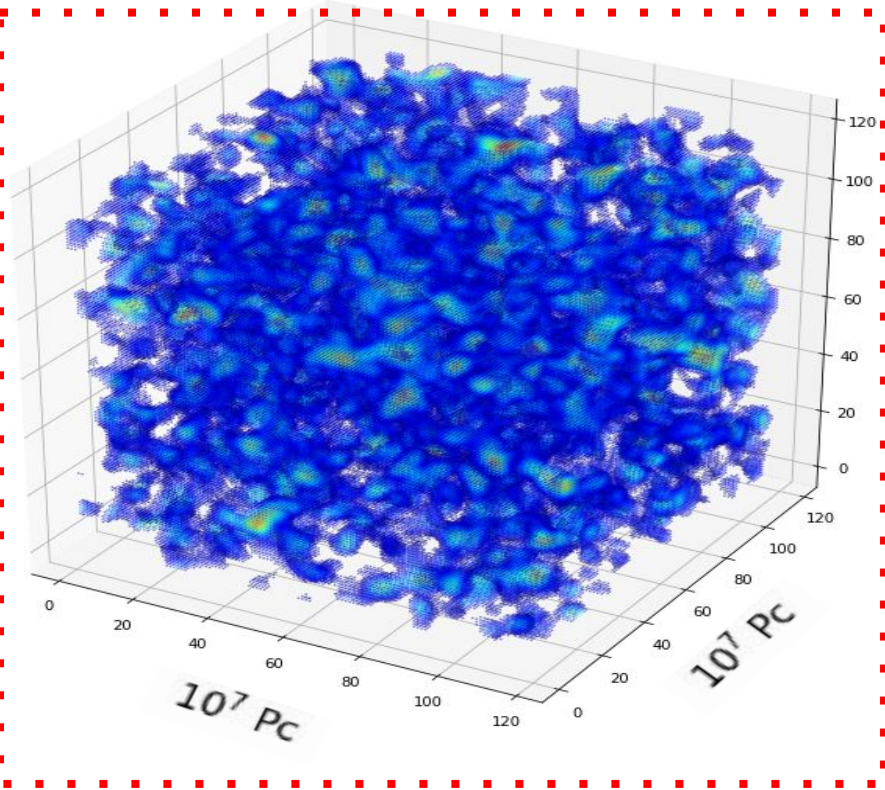


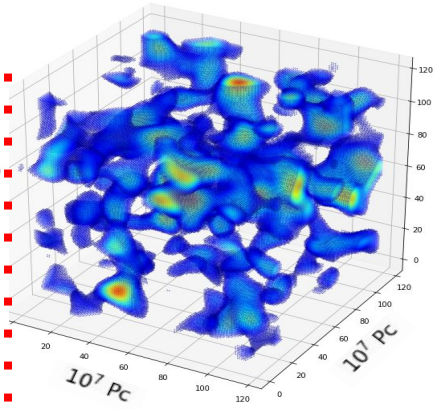
Caracterización
Watershed

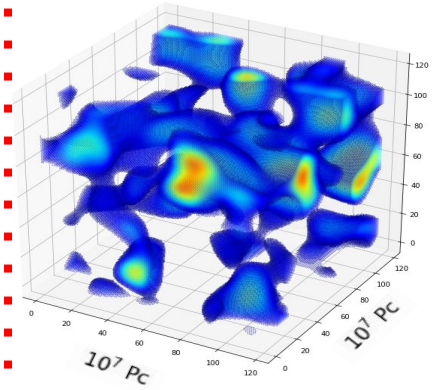
- Recorrido sobre el campo escalar VDC de forma **ascendente o descendente**
- **Segmentación** de grupos por “pozos de potencial“ en el campo escalar de VDC.

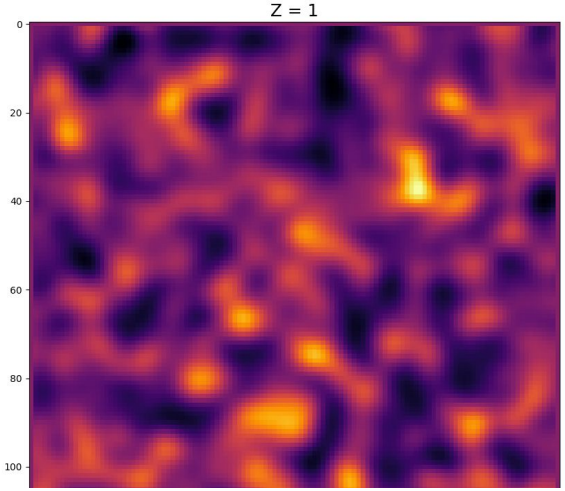


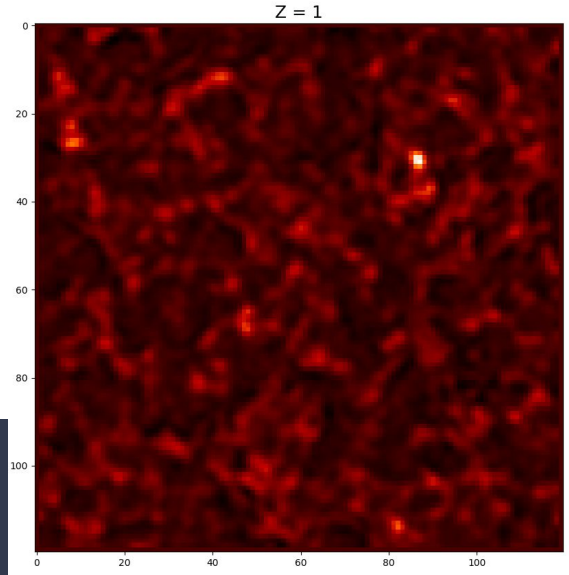
Resultados











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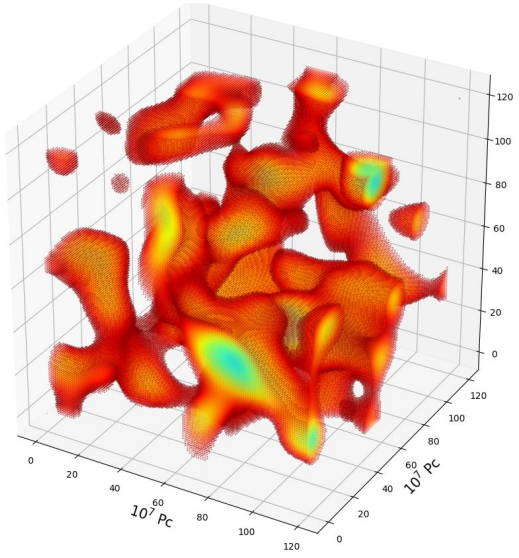
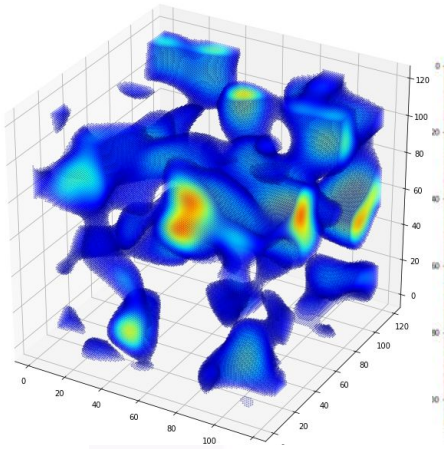
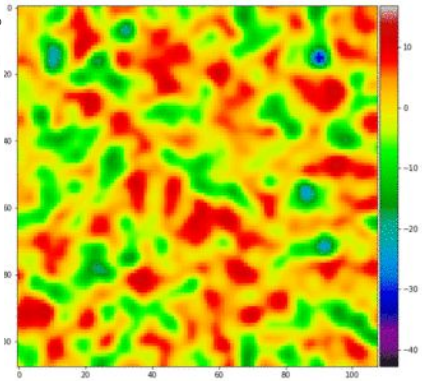
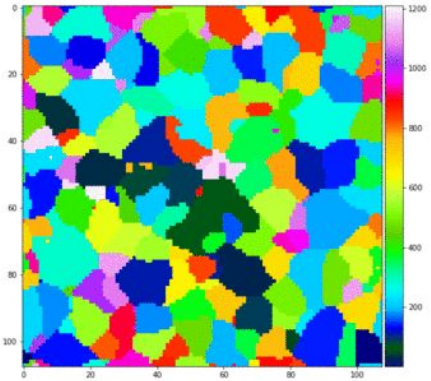
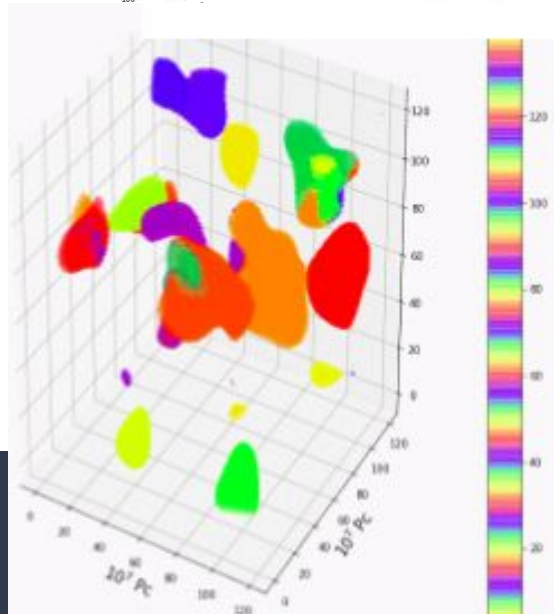
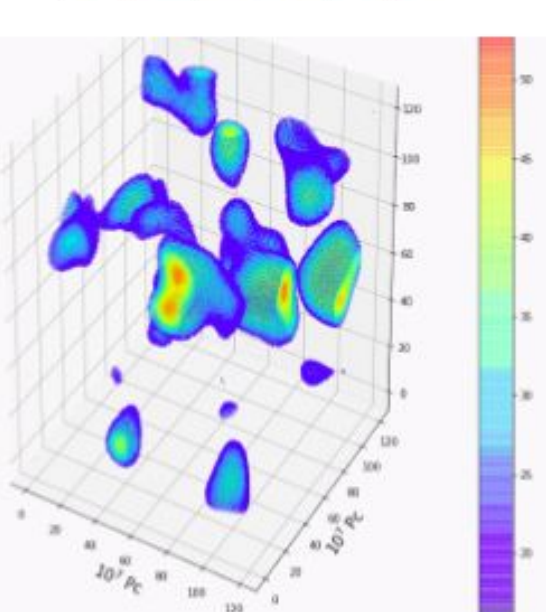






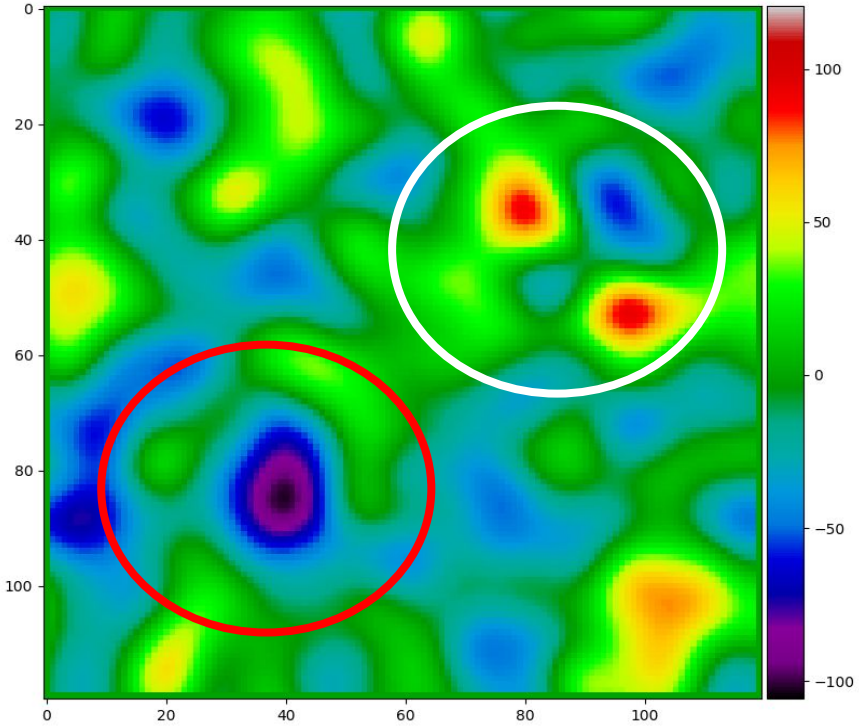


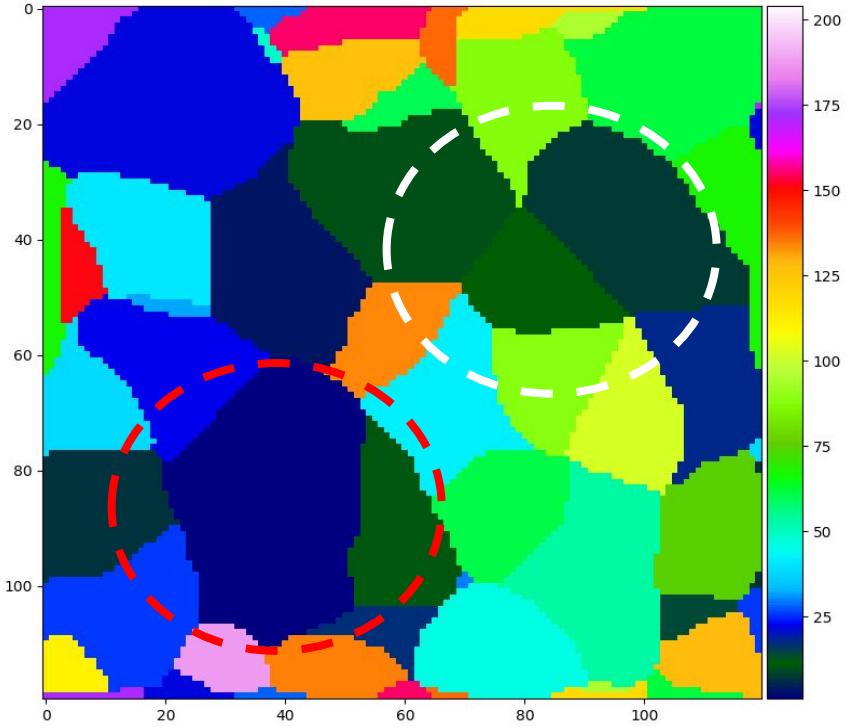




Resultados

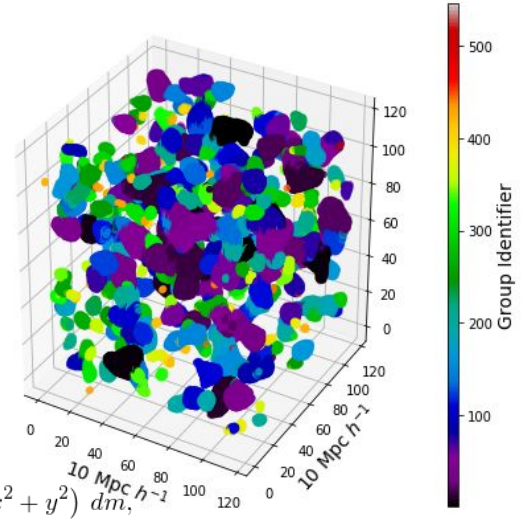
Z = 45/120

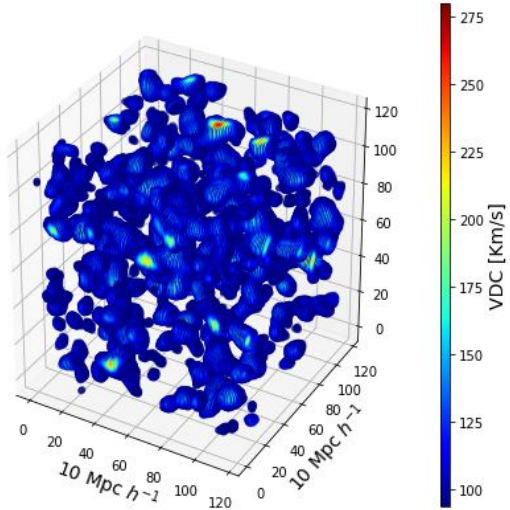




Resultados

Resultados

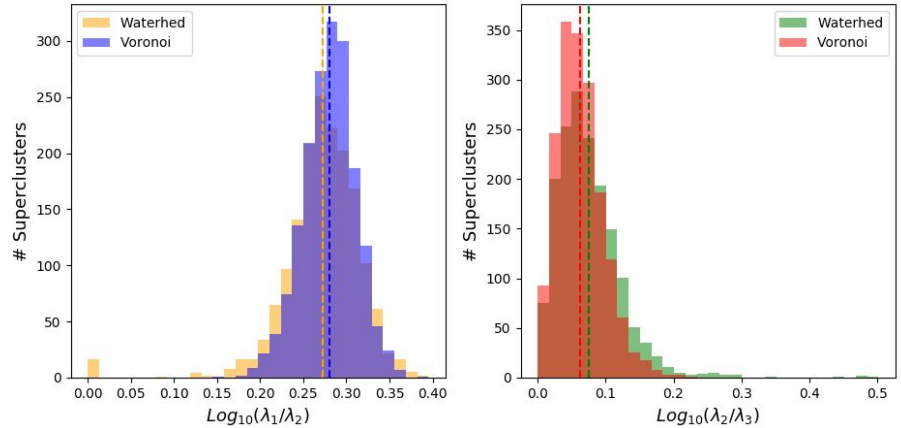


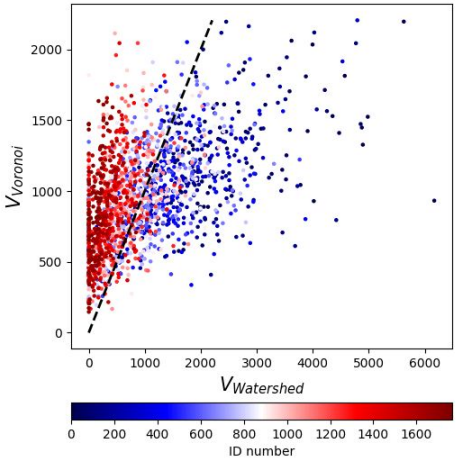


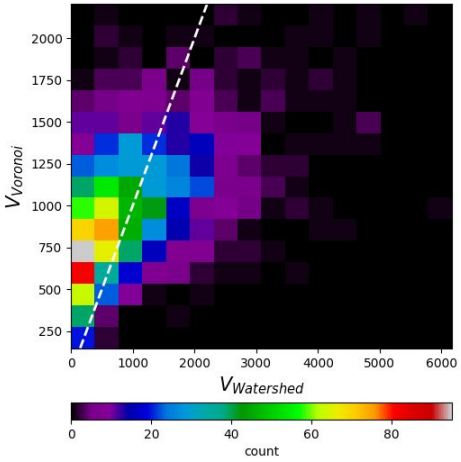
$$\mathbf{I} = \begin{bmatrix} I_{xx} & I_{xy} & I_{xz} \\ I_{yz} & I_{yy} & I_{yz} \\ I_{zx} & I_{zy} & I_{zz} \end{bmatrix}$$

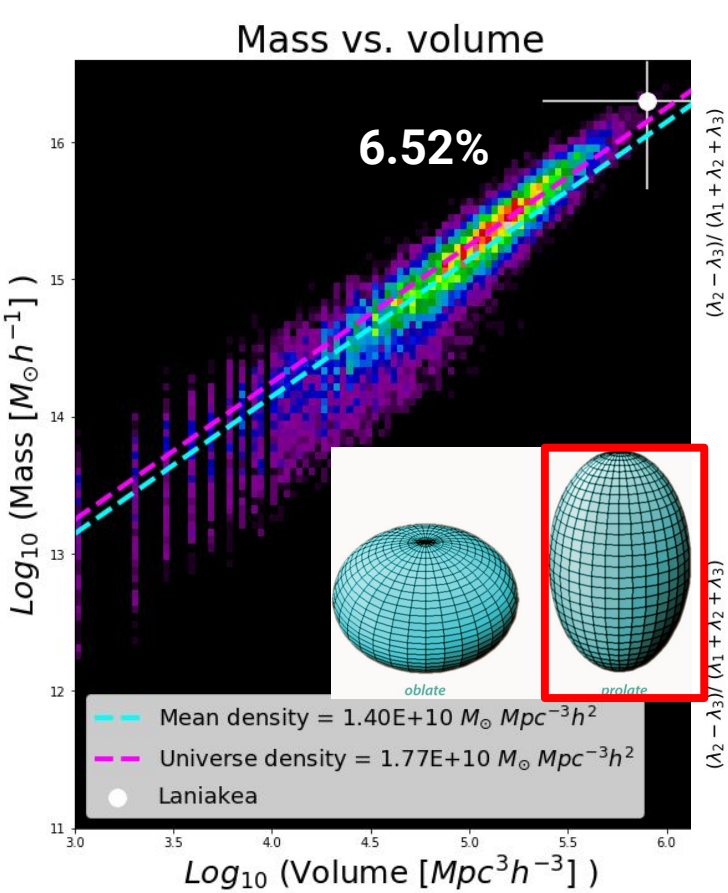
$$I_{xx} = \int_m \left(y^2 + z^2\right)\, dm, \quad I_{yy} = \int_m \left(x^2 + z^2\right)\, dm, \quad I_{zz} = \int_m \left(x^2 + y^2\right)\, dm,$$

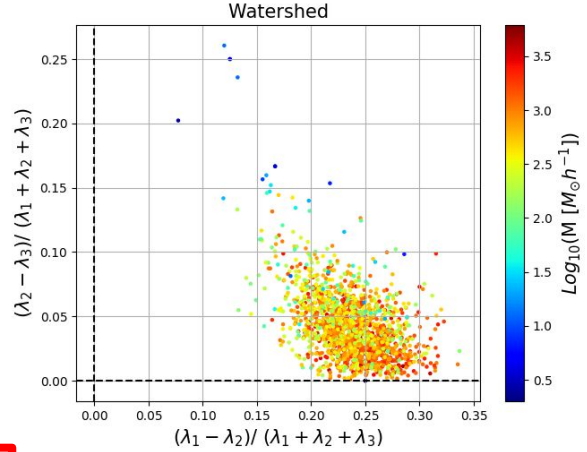
$$I_{xy} = I_{yx} = \int_m xy\, dm, \quad I_{xz} = I_{zx} = \int_m xz\, dm, \quad I_{yz} = I_{zy} = \int_m yz\, dm$$

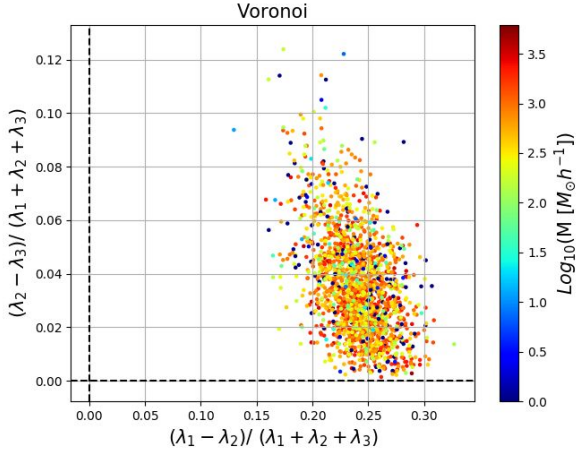


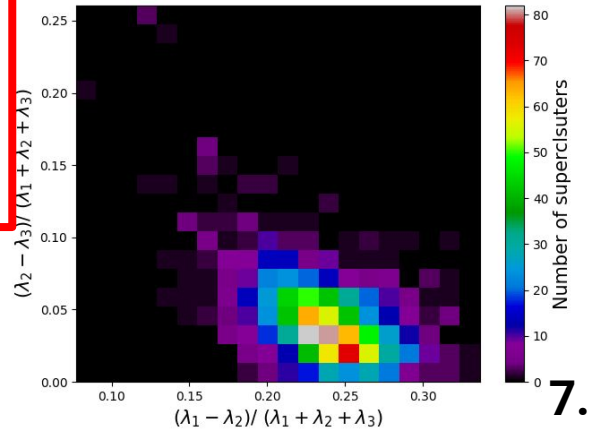












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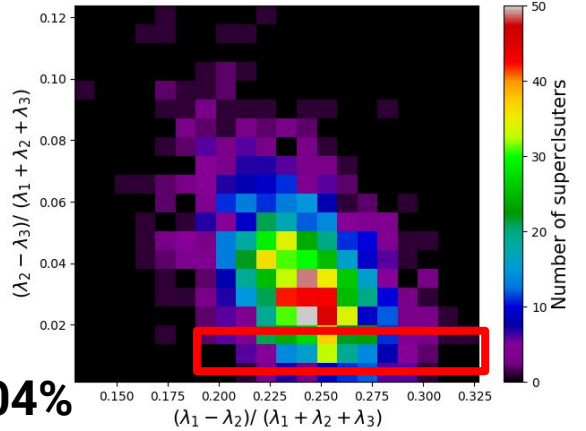

Resultados

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GRACIAS !

Referencias

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