Integrating the UAT into the ADS

Alberto Accomazzi
aaccomazzi@cfa.harvard.edu
NASA Astrophysics Data System
Unified Astronomy Thesaurus Webinar | 8 December 2020

Improving Discovery in ADS with UAT

- Better Understand what the user is looking for
- Properly identify concepts discussed in papers
- Disambiguate meaning of words in corpus
- Leverage curated knowledge graph
- Provide better insights to users

Normalization

gamma-ray bursts

Gamma-ray bursts (629)

Gamma ray burst [Gamma-ray bursts (629)]

GRB [Gamma-ray bursts (629)]

Gamma ray bursts [Gamma-ray bursts (629)]

Gamma-ray burst [Gamma-ray bursts (629)]

Î³-ray bursts [Gamma-ray bursts (629)]

Cosmic gamma ray burst [Gamma-ray bursts (629)]

Cosmic gamma-ray burst [Gamma-ray bursts (629)]

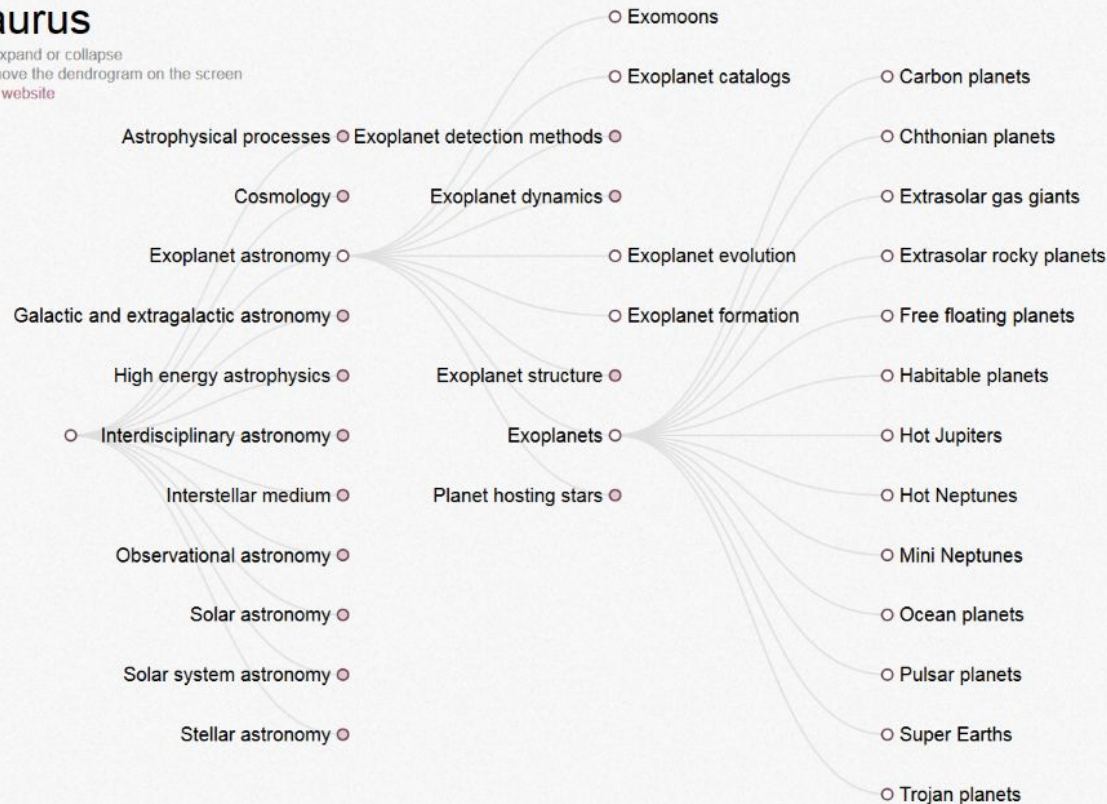# Disambiguation

Hierarchy

Unified Astronomy Thesaurus

click a node to expand or collapse
click & drag to move the dendrogram on the screen
back to the UAT website

- Astrophysical processes
- Cosmology
- Exoplanet astronomy
- Galactic and extragalactic astronomy
- High energy astrophysics
- Interdisciplinary astronomy
- Interstellar medium
- Observational astronomy
- Solar astronomy
- Solar system astronomy
- Stellar astronomy

- Exomoons
- Exoplanet catalogs
- Exoplanet detection methods
- Exoplanet dynamics
- Exoplanet evolution
- Exoplanet formation
- Exoplanet structure
- Exoplanets
- Planet hosting stars

- Carbon planets
- Chthonian planets
- Extrasolar gas giants
- Extrasolar rocky planets
- Free floating planets
- Habitable planets
- Hot Jupiters
- Hot Neptunes
- Mini Neptunes
- Ocean planets
- Pulsar planets
- Super Earths
- Trojan planets

What about subject heading keywords?

Incomplete: don't cover all subject areas

Subjective: assigned, not validated

Ambiguous: meaning not always grounded

Sparse: most ADS records don't have any

Not a good filter!

What about discovery?

Currently ADS collects and uses all keywords
  available for each paper

Since multiple keyword systems are in use,
  cross-linking papers not effective

Ideally, with wide UAT adoption and labeling:
  1. All papers have UAT terms assigned
  2. Concepts used for filtering, browsing
  3. Papers cross-linked via UAT terms:

   Galactic and extragalactic astronomy >
      Galaxy Physics >
         Galaxy Mergers (608)

Circumbinary Disks: Accretion and Torque as a Function of Mass Ratio and Disk Viscosity

Show affiliations

Duffell, Paul C.; D'Orazio, Daniel; Derdzinski, Andrea; Haiman, Zoltan; MacFadyen, Andrew; Rosen, Anna L.; Zrake, Jonathan

Using numerical hydrodynamics calculations and a novel method for densely sampling parameter space, we measure the accretion and torque on a binary system from a circumbinary disk. In agreement with some earlier studies, we find that the net torque on the binary is positive for mass ratios close to unity, and that accretion always drives the binary toward equal mass. Accretion variability depends sensitively on the numerical sink prescription, but the torque and relative accretion onto each component do not depend on the sink timescale. Positive torque and highly variable accretion occurs only for mass ratios greater than around 0.05. This means that for mass ratios below 0.05, the binary would migrate inward until the secondary accreted sufficient mass, after which it would execute a U-turn and migrate outward. We explore a range of viscosities, from α = 0.03 to α = 0.15, and find that this outward torque is proportional to the viscous torque, so that torque per unit accreted mass is independent of α. Dependence of accretion and torque on mass ratio is explored in detail, densely sampling mass ratios between 0.01 and unity. For mass ratio q > 0.2, accretion variability is found to exhibit a distinct sawtooth pattern, typically with a five-orbit cycle that provides a smoking gun prediction for variable quasars observed over long periods, as a potential means to confirm the presence of a binary.

Publication: The Astrophysical Journal, Volume 901, Issue 1, id.25, 9 pp.

Pub Date: September 2020

DOI: 10.3847/1538-4357/abab95

arXiv: arXiv:1911....90

Bibcode: 2020ApJ...901...25D

Keywords: Galaxy mergers; Quasars; Supermassive black holes; Black holes; Circumstellar disks; Galaxy accretion disks; Binary stars; Active galactic nuclei; Wide binary stars; Astrophysical fluid dynamics; Close binary stars; Shocks; 608; 1319; 1663; 162; 235; 562; 154; 16; 1801; 101; 254; 2086; Astrophysics - Solar and Stellar Astrophysics; Astrophysics - Earth and Planetary Astrophysics; Astrophysics - Astrophysics of Galaxies; Astrophysics - High Energy Astrophysical Phenomena

E-Print ApJ Accepted
Comments:
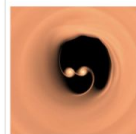
FULL TEXT SOURCES
My Institution
Publisher
arXiv

Add paper to library

GRAPHICS
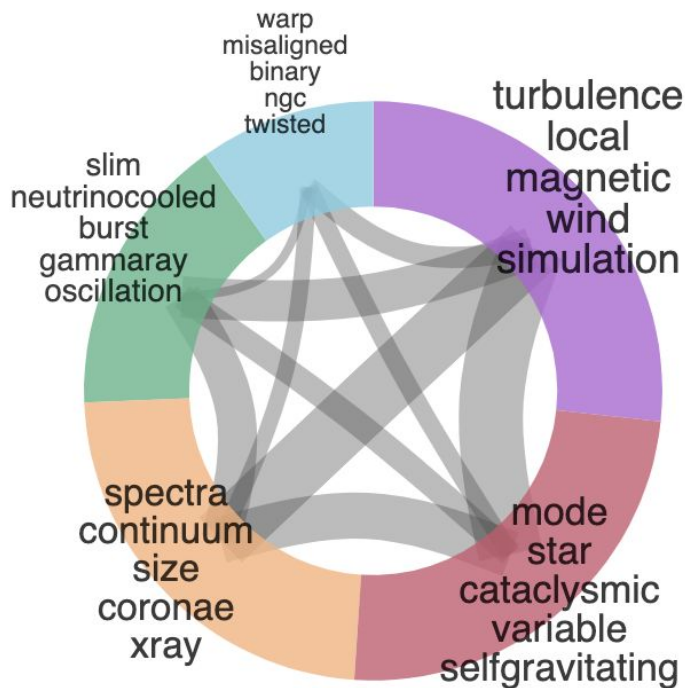Click to view more

From words to concepts: paper networks
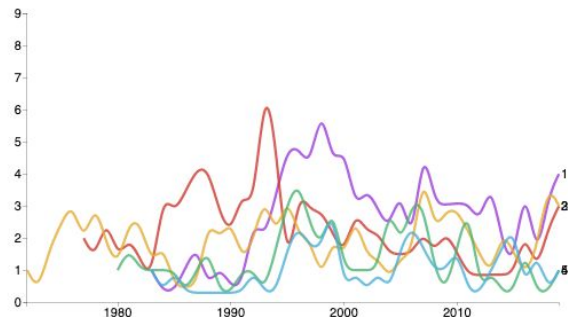
From words to concepts: word clouds
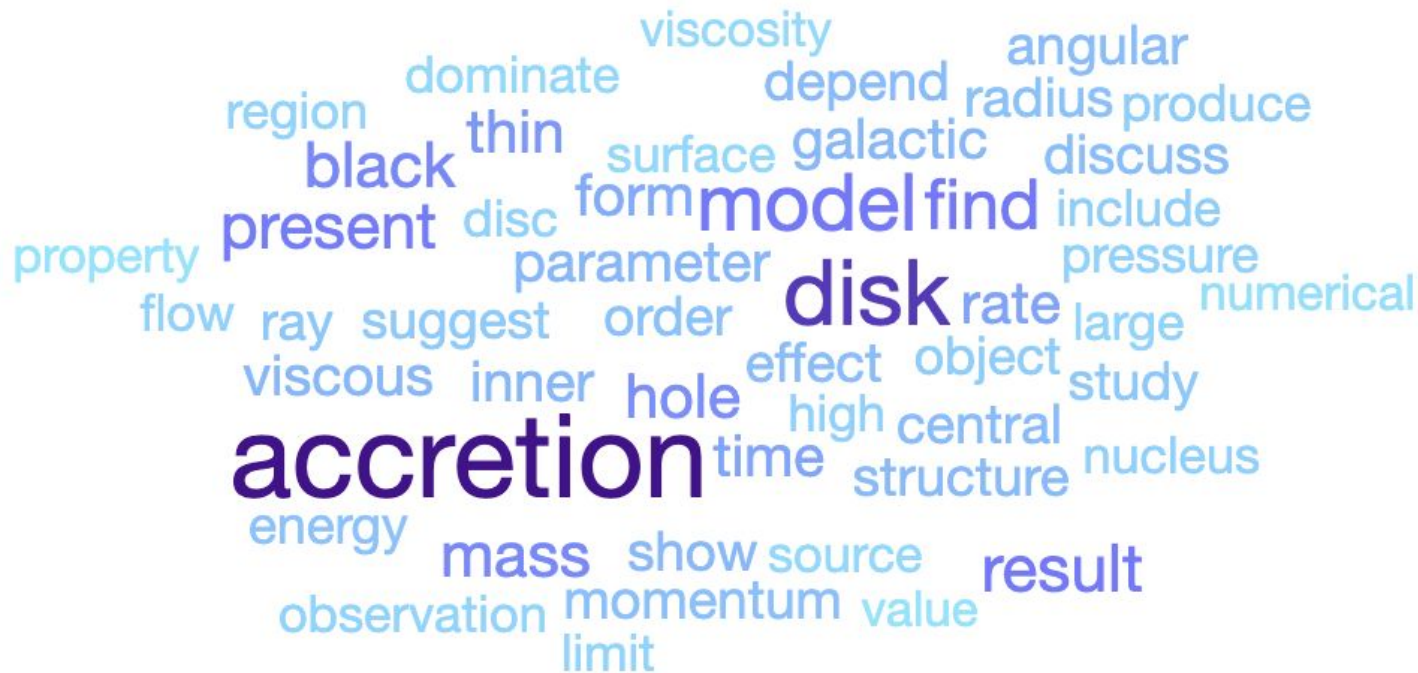
Plan

- Promote the use of the UAT as a the standard system for assigning concepts to Literature, Data, Software
- Start enabling cross-linking of papers with UAT concepts in ADS in 2021, increasing their exposure to the users
- Use Machine Learning techniques to automatically assign UAT concepts to prior literature
- Use UAT concepts rather than extracted keywords in ADS visualizations, analytics
- Extend system to use concepts drawn from other thesauri for content in other disciplines as appropriate