

# Closing on the Main Strong R-process Nucleosynthesis Sites

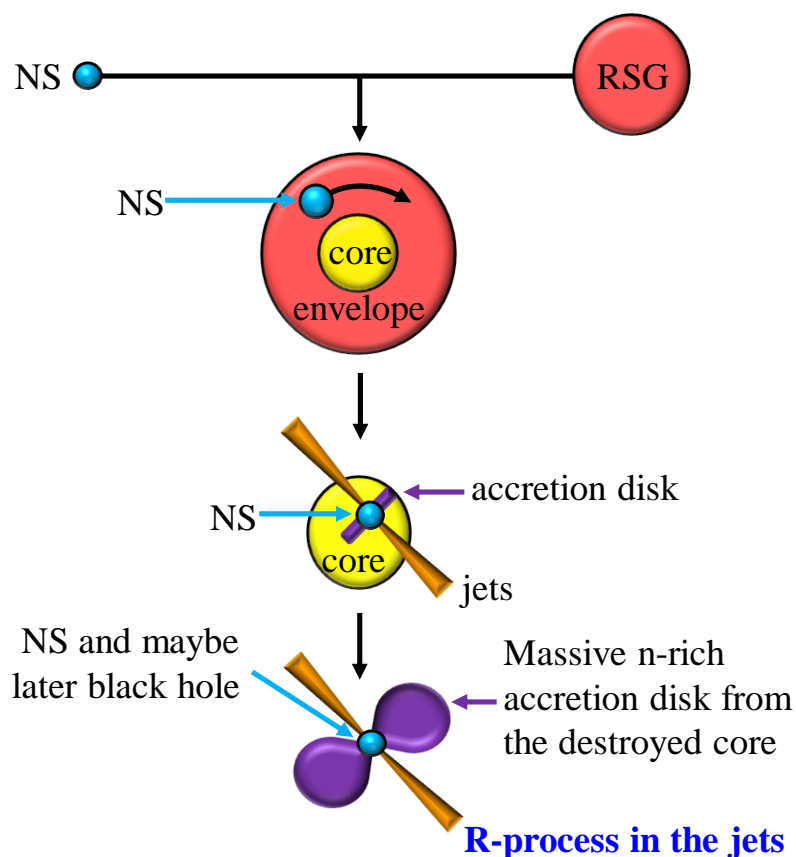
**Aldana Grichener and Noam Soker (arXiv: 2008.00001)**  
Physics Department, Technion Israel Institute of Technology

## Abstract

We study the basic properties of 3 possible r-process production sites and carefully compare them to recent observations and theoretical simulations. We find that the **common envelope jets supernova (CEJSN) r-process** scenario can account for the different problems concerning r-process nucleosynthesis, including the presence of r-process rich stars in low metallicity zones in ultra-faint dwarf (UFD) galaxies.

## The CEJSN Scenario

Our scenario begins with two massive stars in a binary system. The heavier star explodes and forms a neutron star (NS) or a black hole (BH) while the lighter star evolves to a red super-giant (RSG). In some cases the system will take a route that brings it to become a CEJSN, as follows.



## Comparison with Observations

	NS-NS merger	Collapsar	CEJSN r-process
'Knee' in the r-process distribution pattern	✗	✓	✓
Short-lived radioactive isotopes in the early solar system	✓	✗	✓
No Correlation of r-process and iron production	✓	✗	✓
Presence of r-process elements in ultra-faint dwarf galaxies	✗	✓	✓
Very early r-process in ultra-faint dwarf galaxies	✗	✓	✓

**Acronyms:** NS: neutron star; CEJSN: common envelope jets supernova.

**Summary: CEJSNe have some advantages over NS-NS mergers and over collapsars as heavy r-process sites. It is very likely that more than one site exists.**