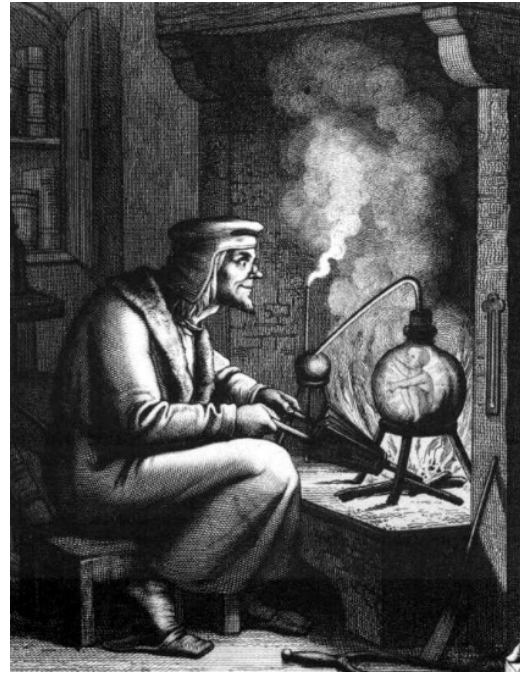


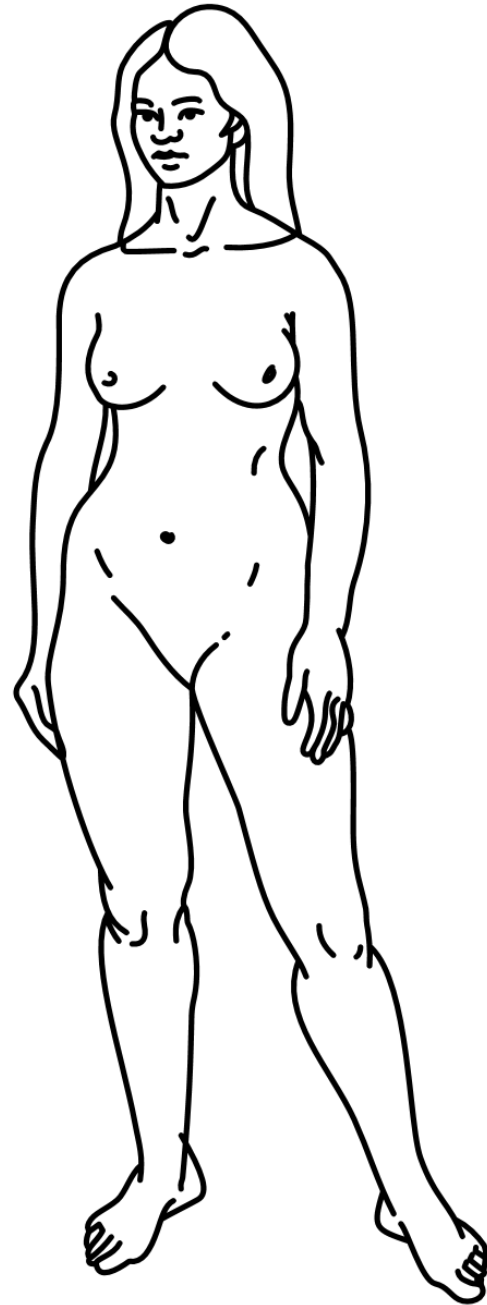
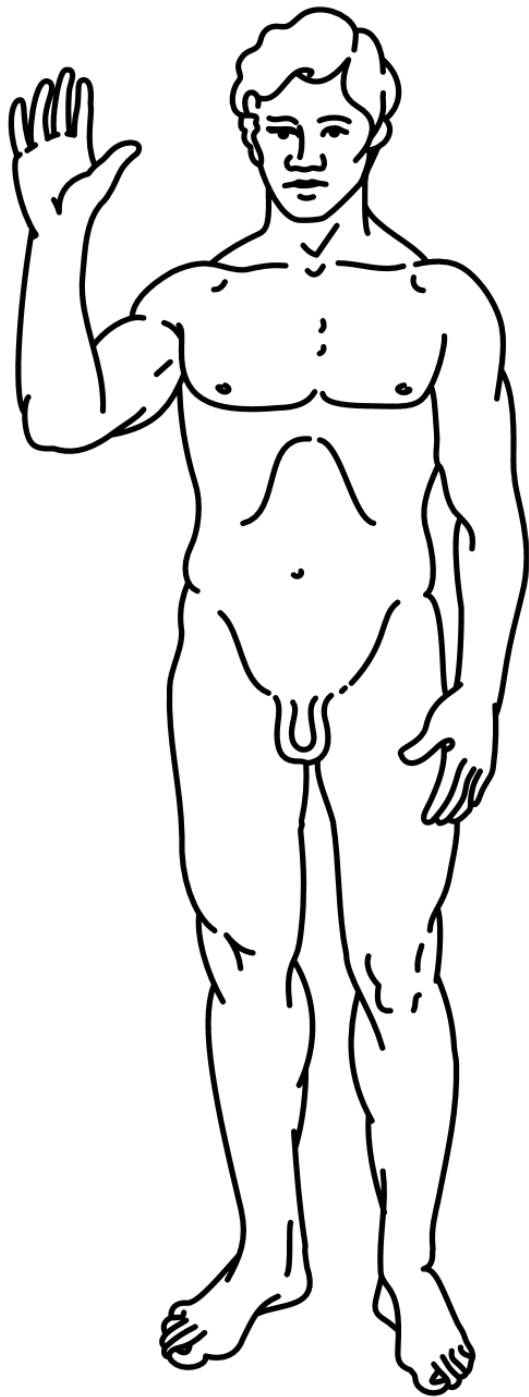


Kosmische Hexenkessel über Die Entstehung der Elemente

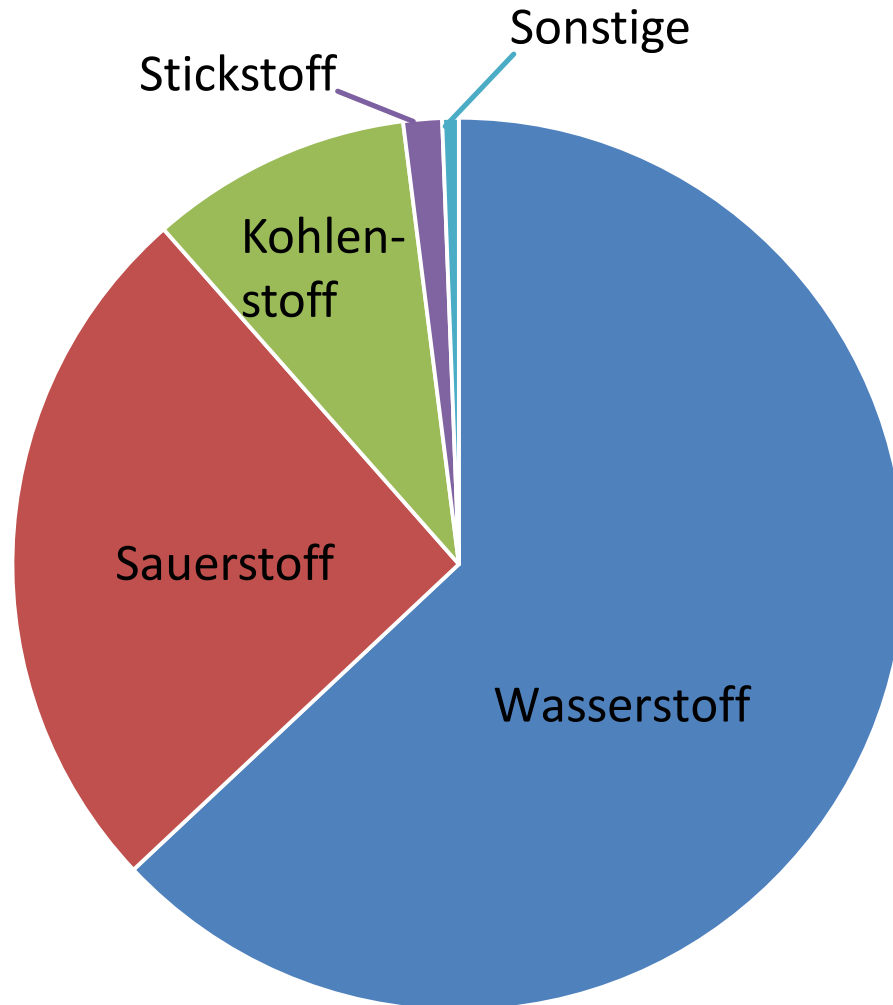
ELEMENTS @ Night of Science

René Reifarth
Goethe-Universität Frankfurt



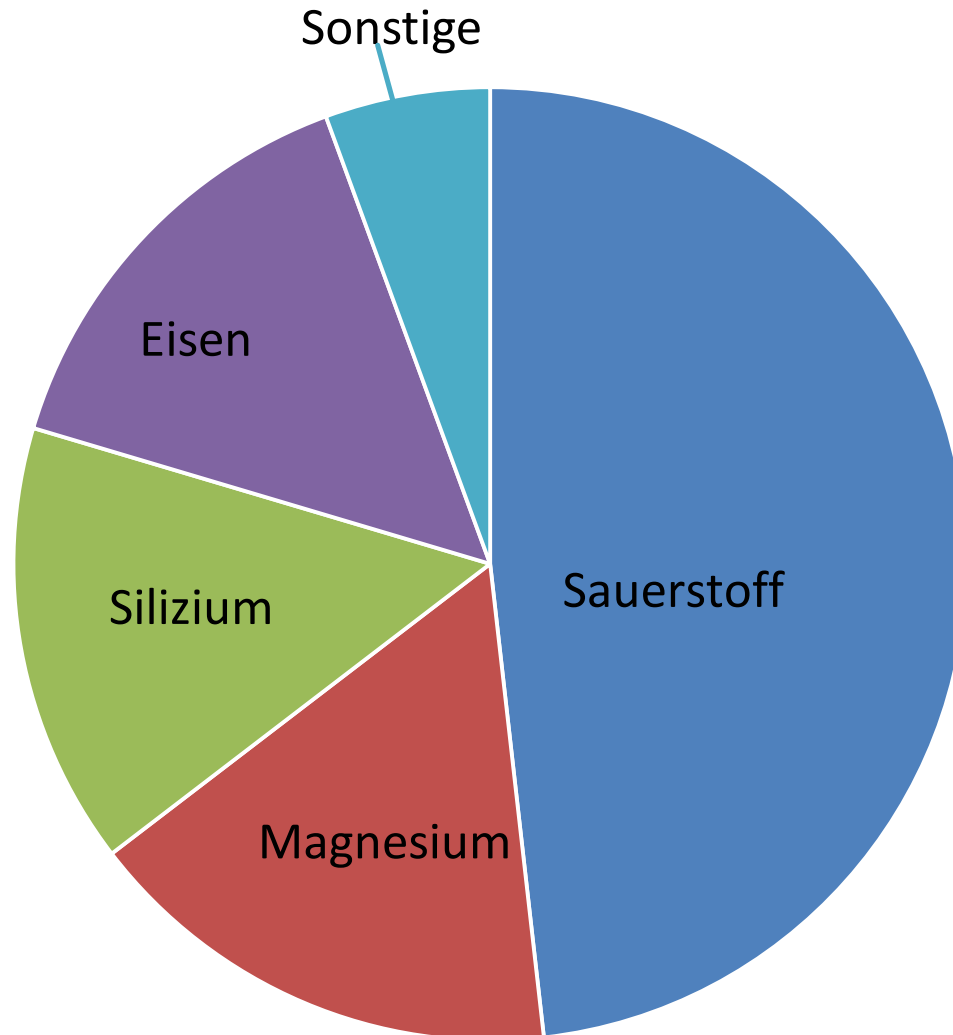


Mensch





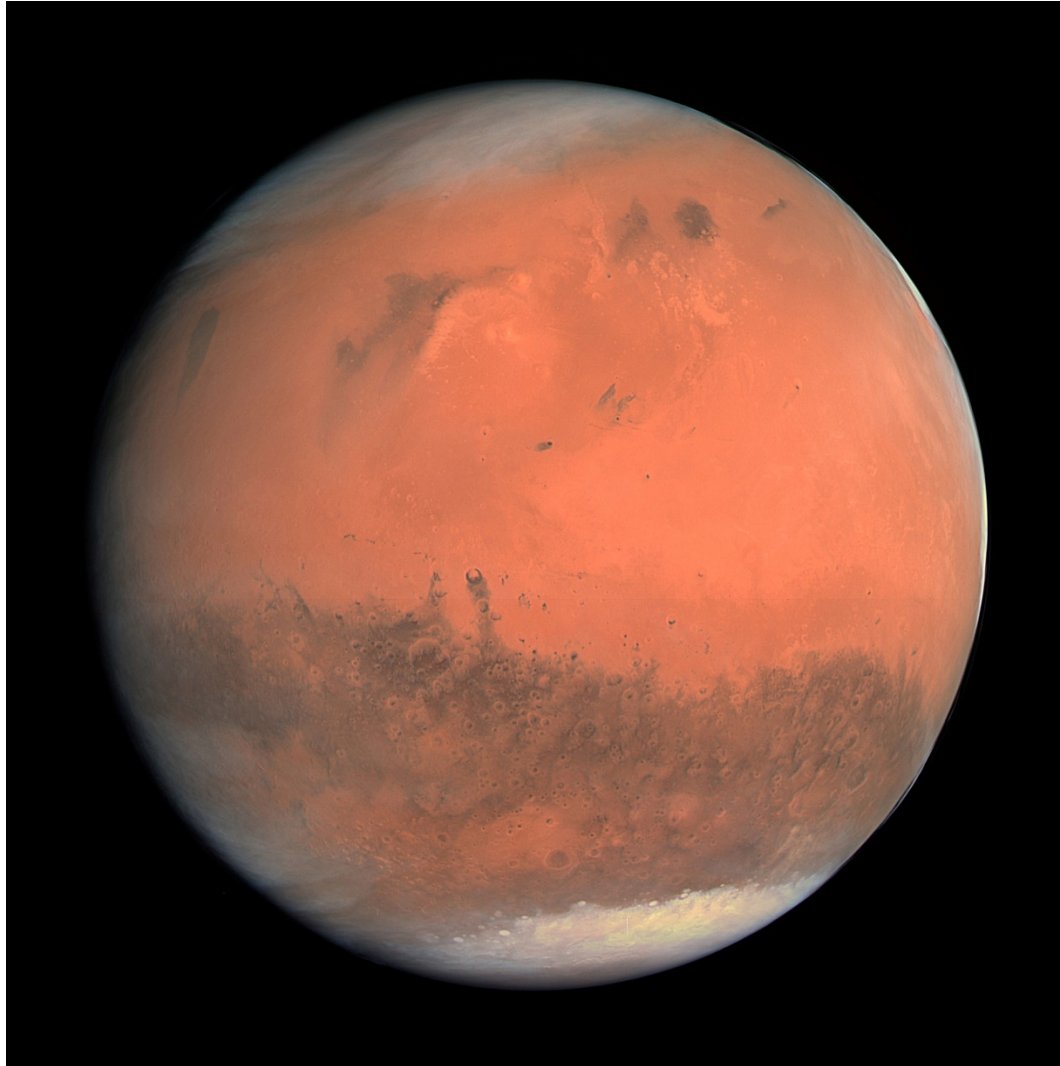
Erde



Erde – Sand & Rost

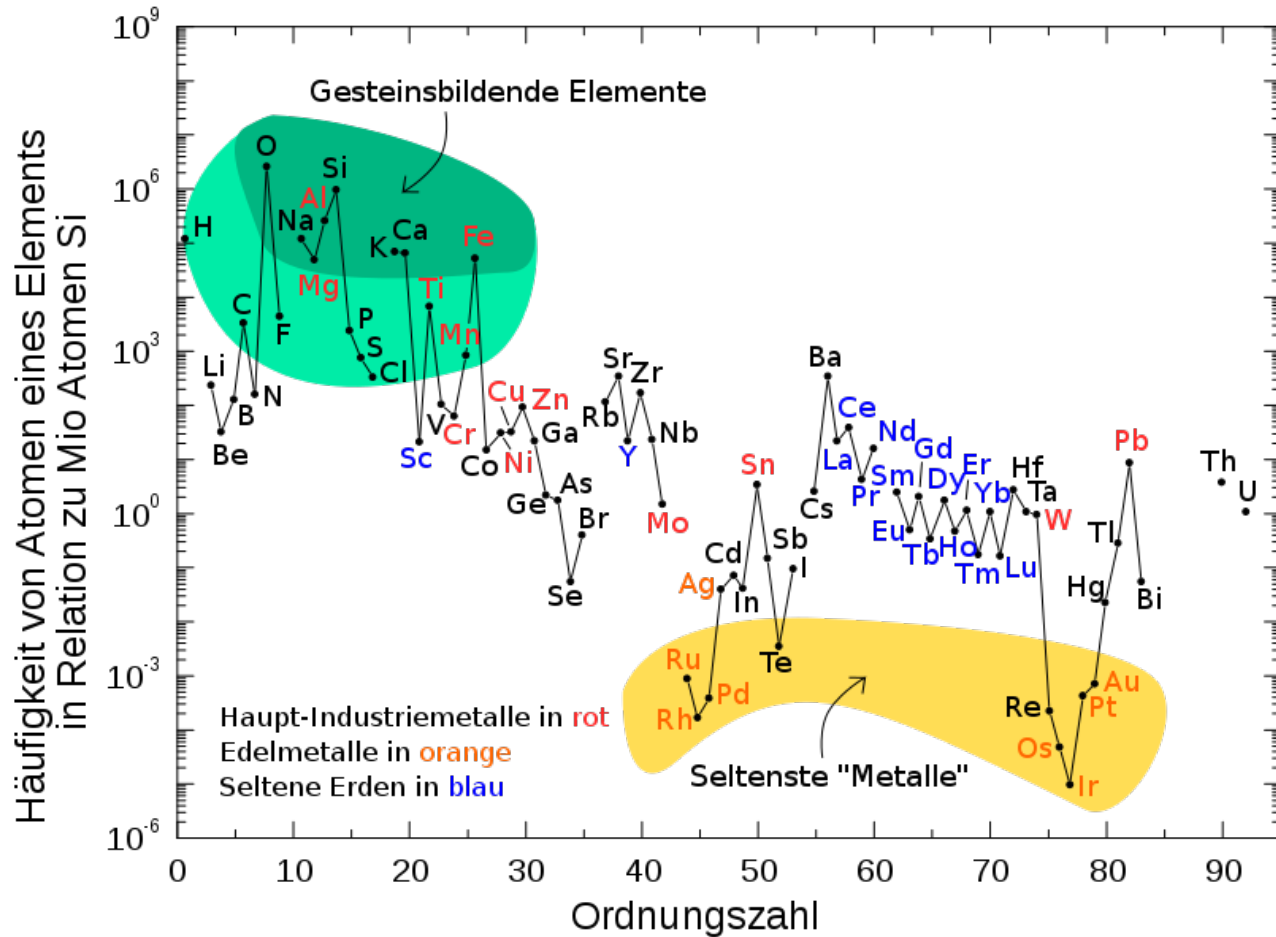


Mars – Sand & Rost

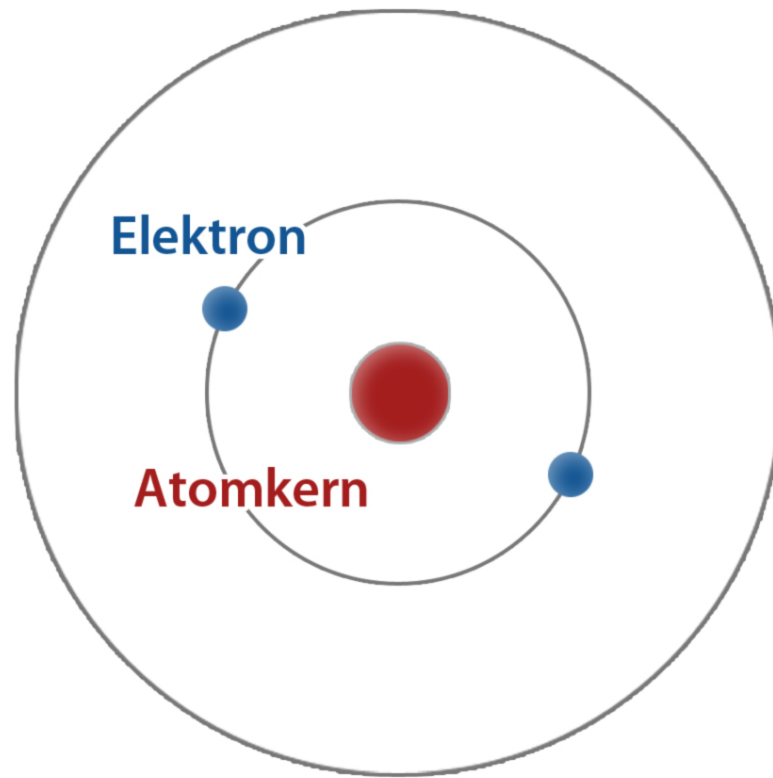


By ESA - European Space Agency & Max-Planck Institute for Solar System Research for OSIRIS Team ESA/MPS/UPD/LAM/IAA/RSSD/INTA/UPM/DASP/IDA - http://www.esa.int/spaceinimages/Images/2007/02/True-colour_image_of_Mars_seen_by_OSIRIS, CC BY-SA 3.0-igo, <https://commons.wikimedia.org/w/index.php?curid=56489423>

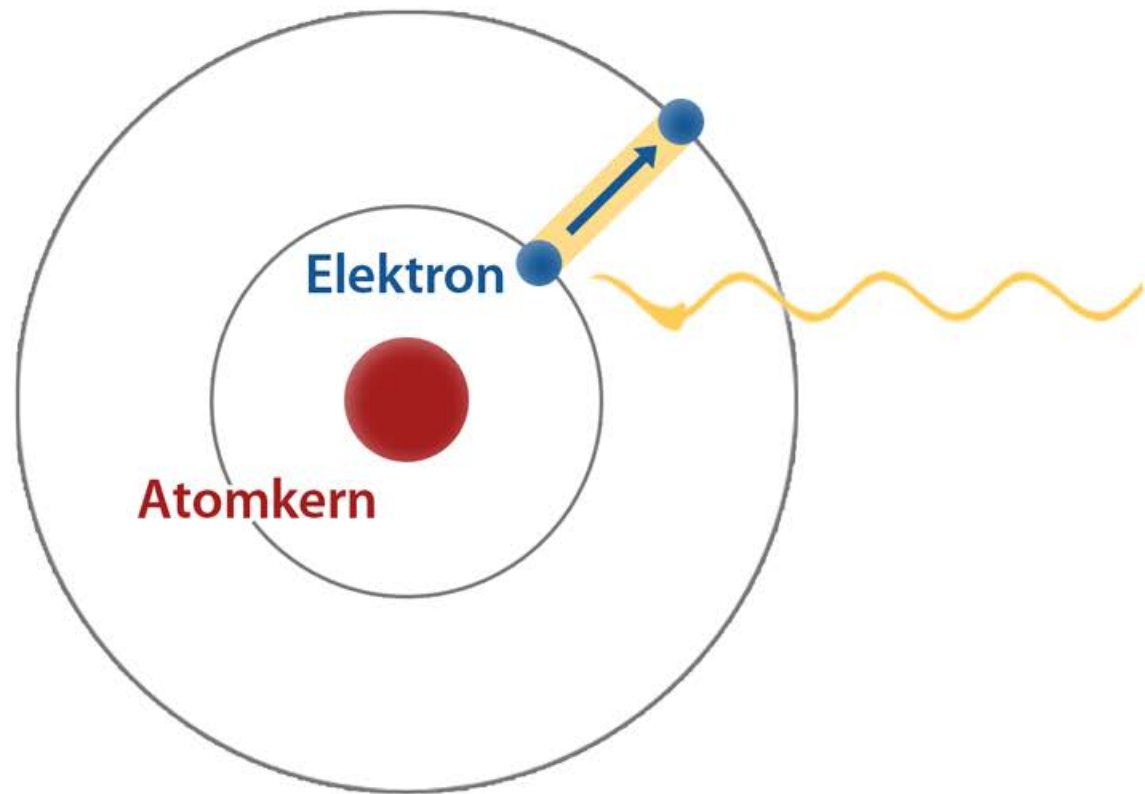
Die Erde – en detail



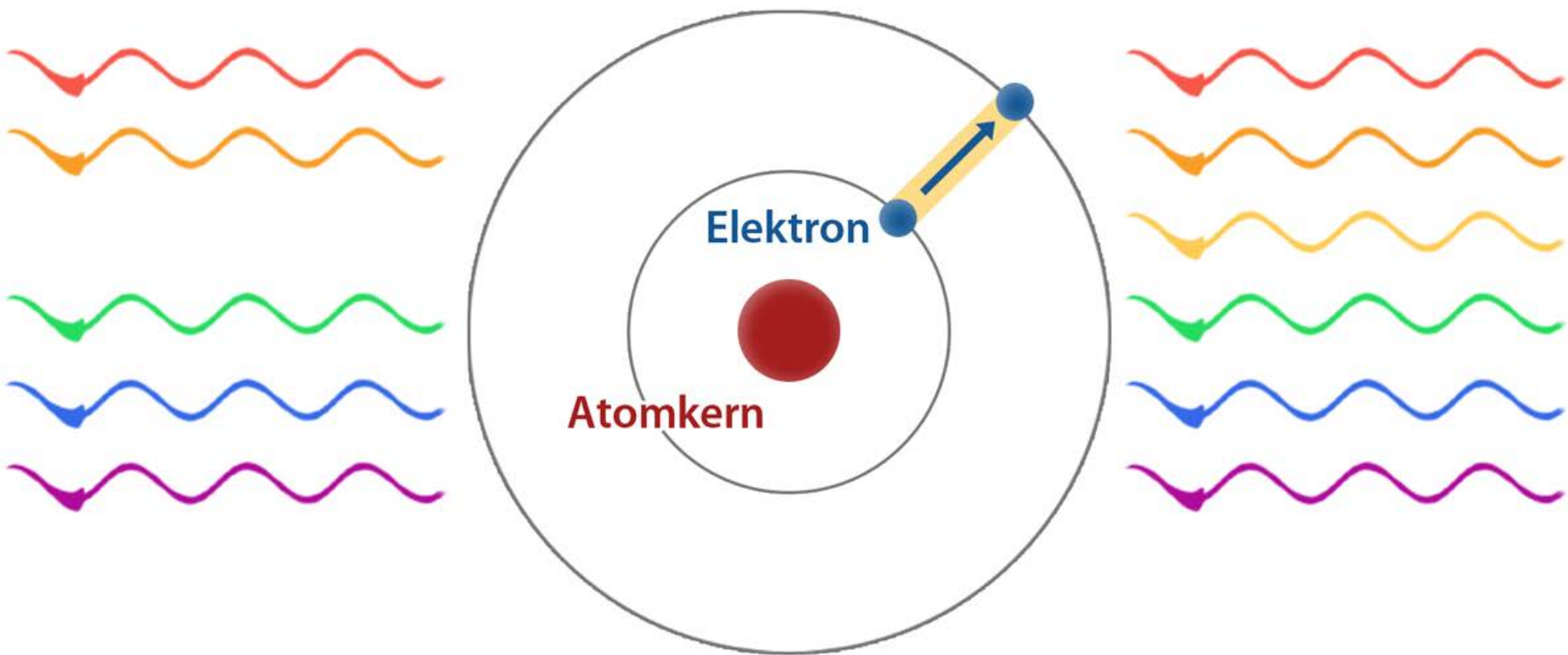
Aufbau der Atome



Absorption von Photonen



Absorption von Photonen

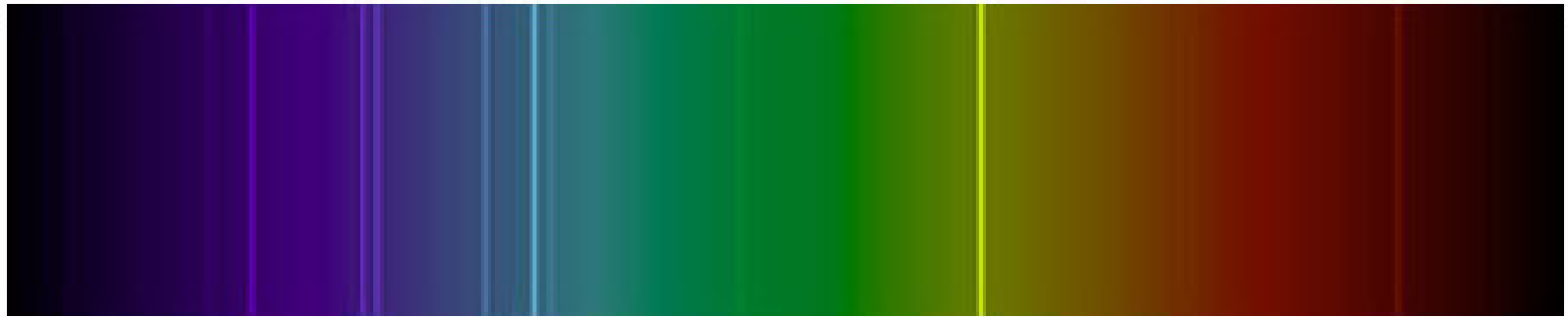


Fraunhofer – ein Blick in die Ferne

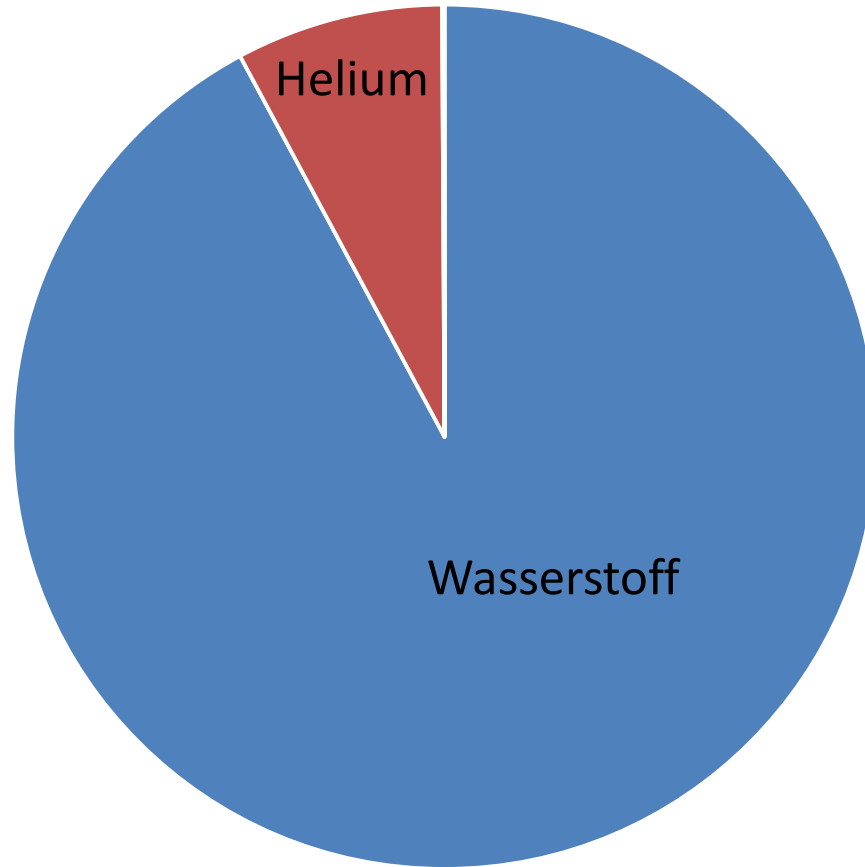




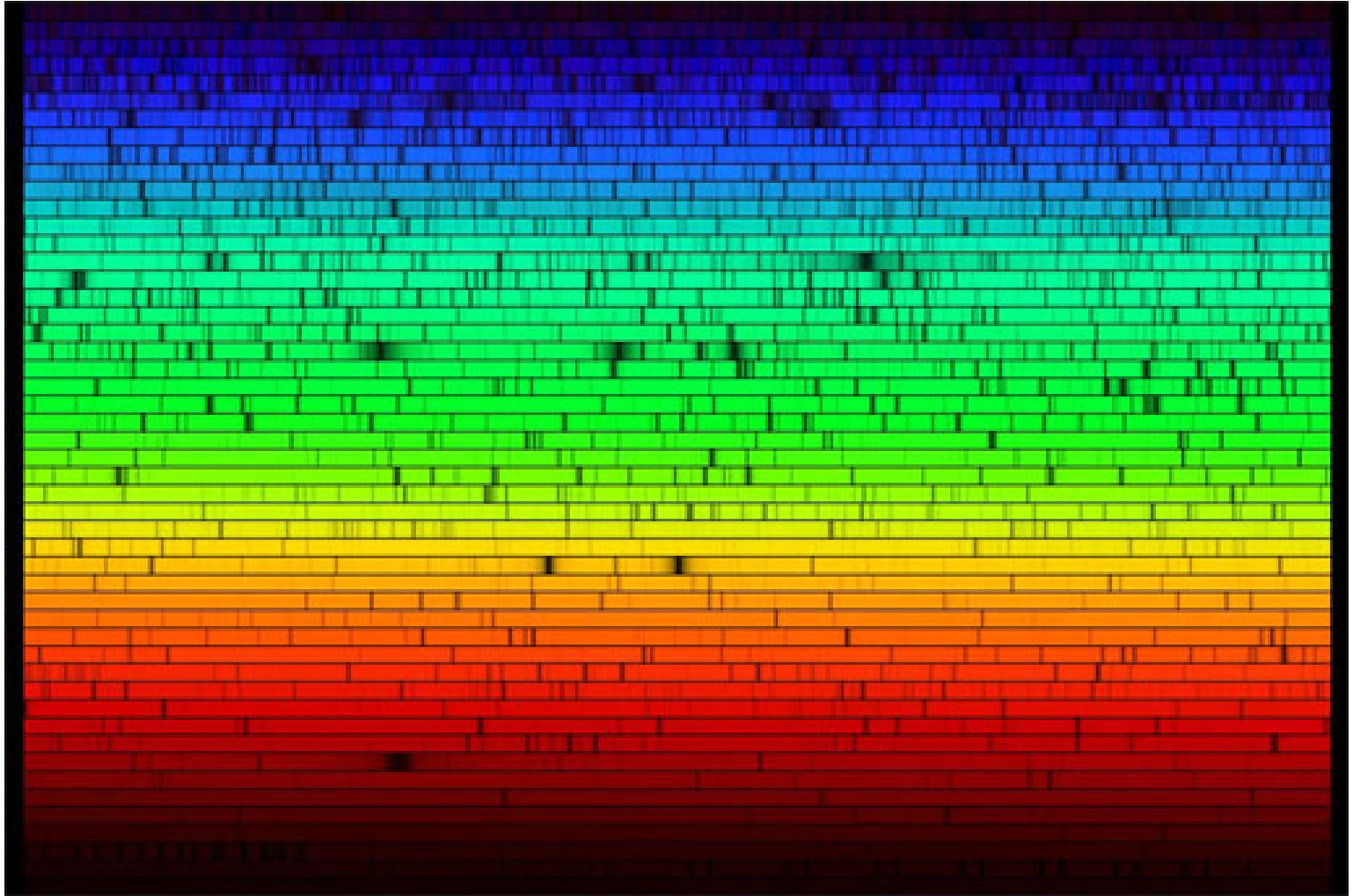
Helium – das Sonnenelement



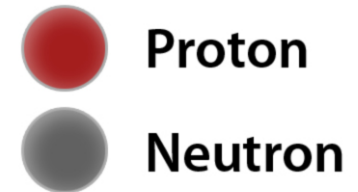
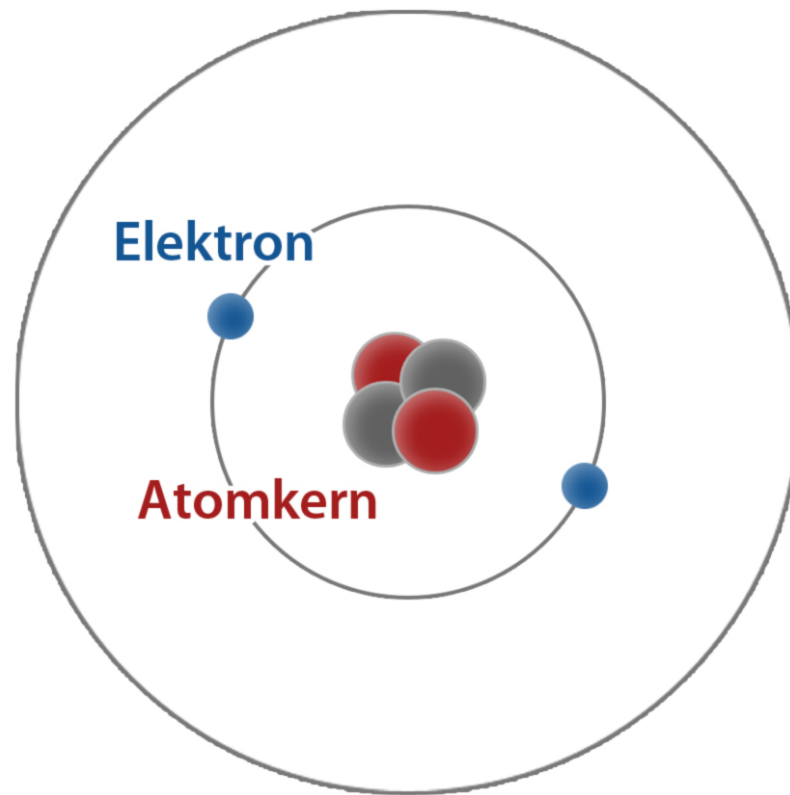
Sonnensystem



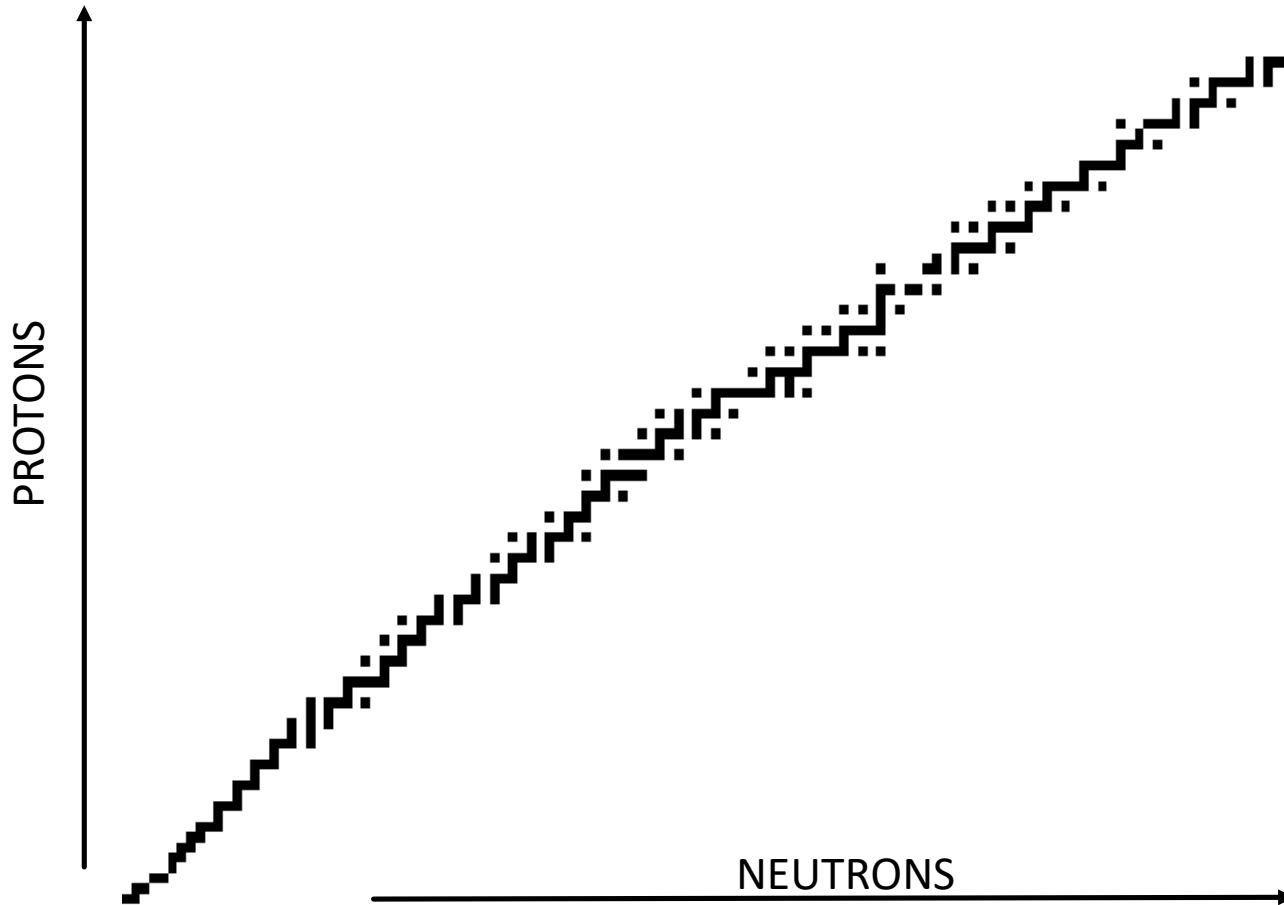
Genauer Blick zur Sonne



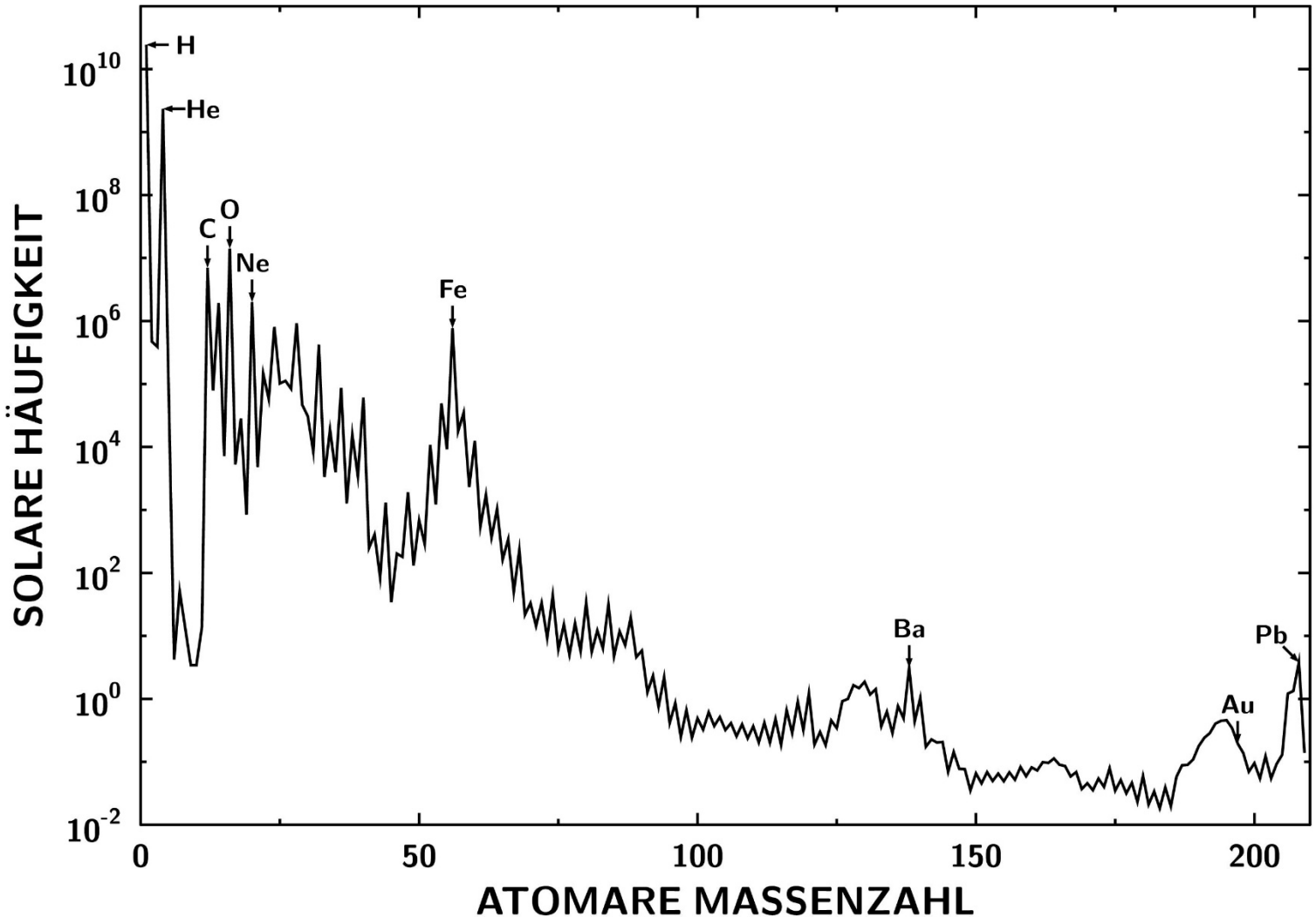
Aufbau der Atomkerne



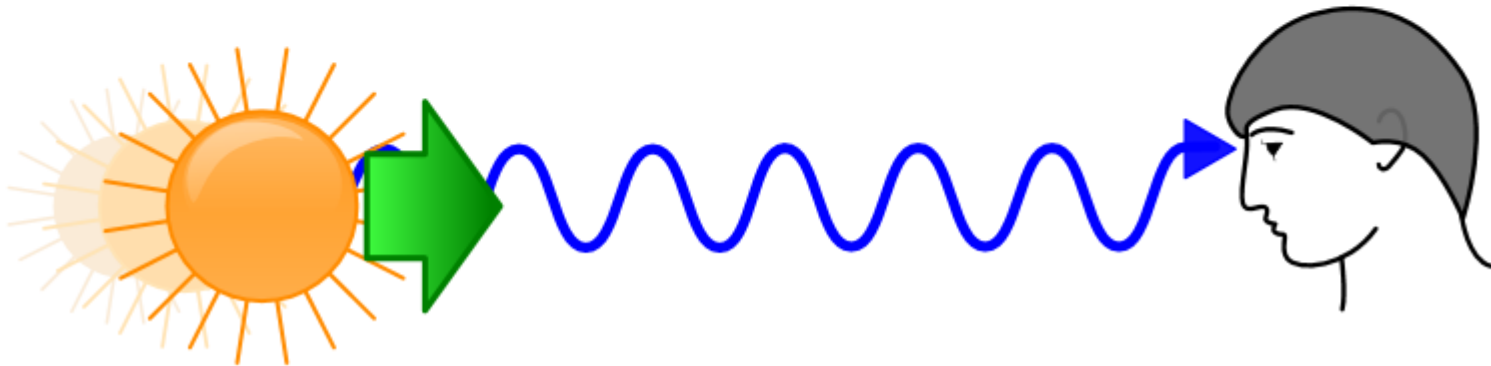
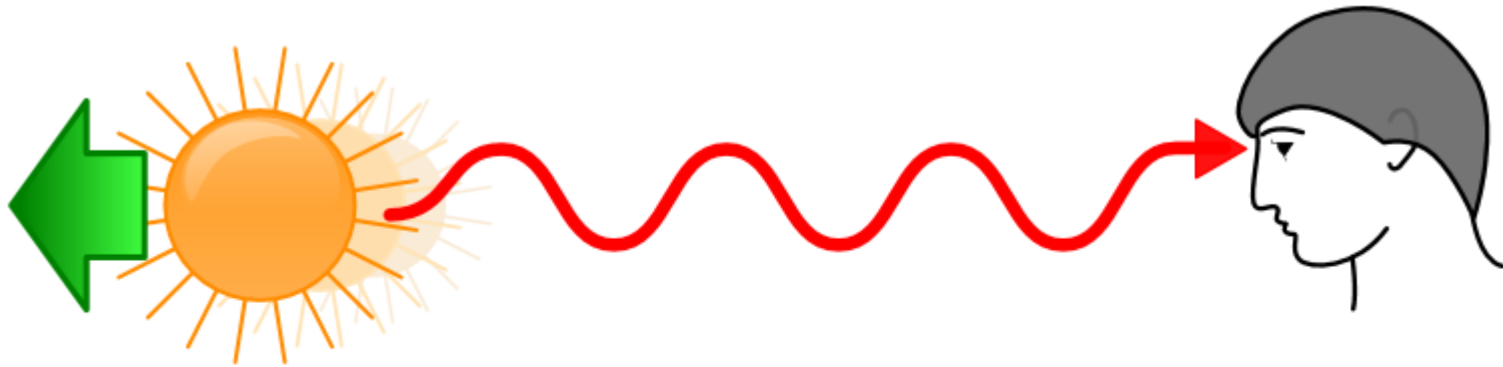
Die Karte der stabilen Isotope



Häufigkeitsverteilung im Sonnensystem

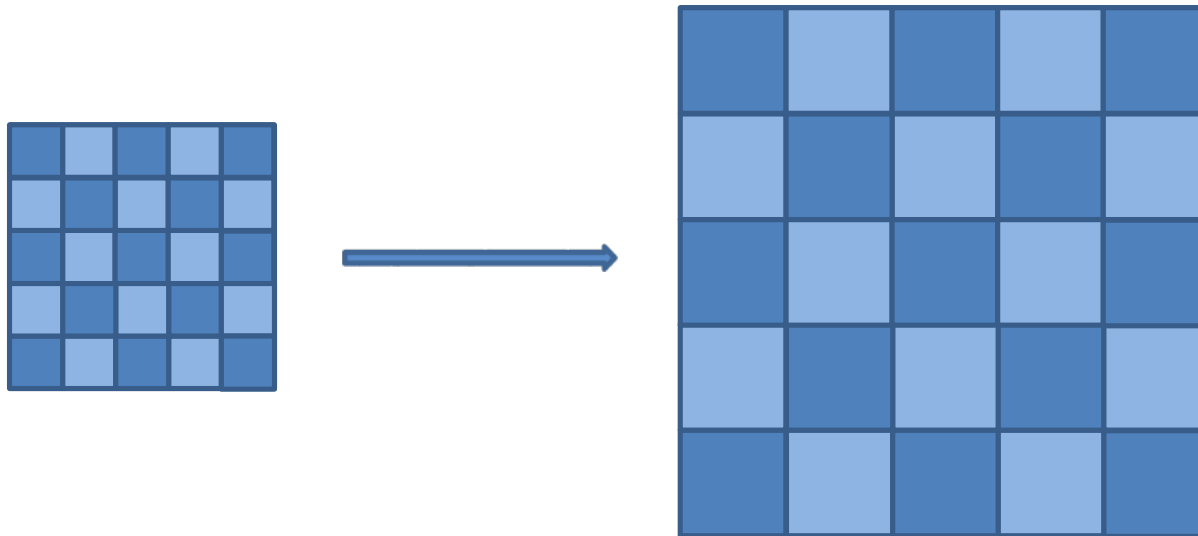


Bewegte Objekte verändern ihre Farbe



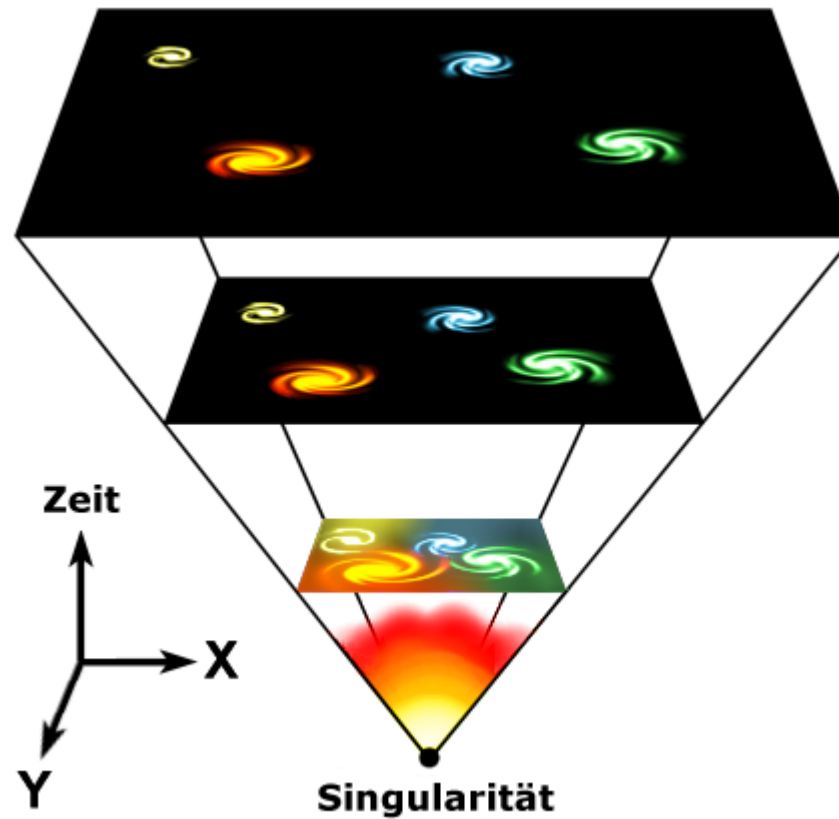
Hubblesches Gesetz

Geschwindigkeit / Entfernung = konstant

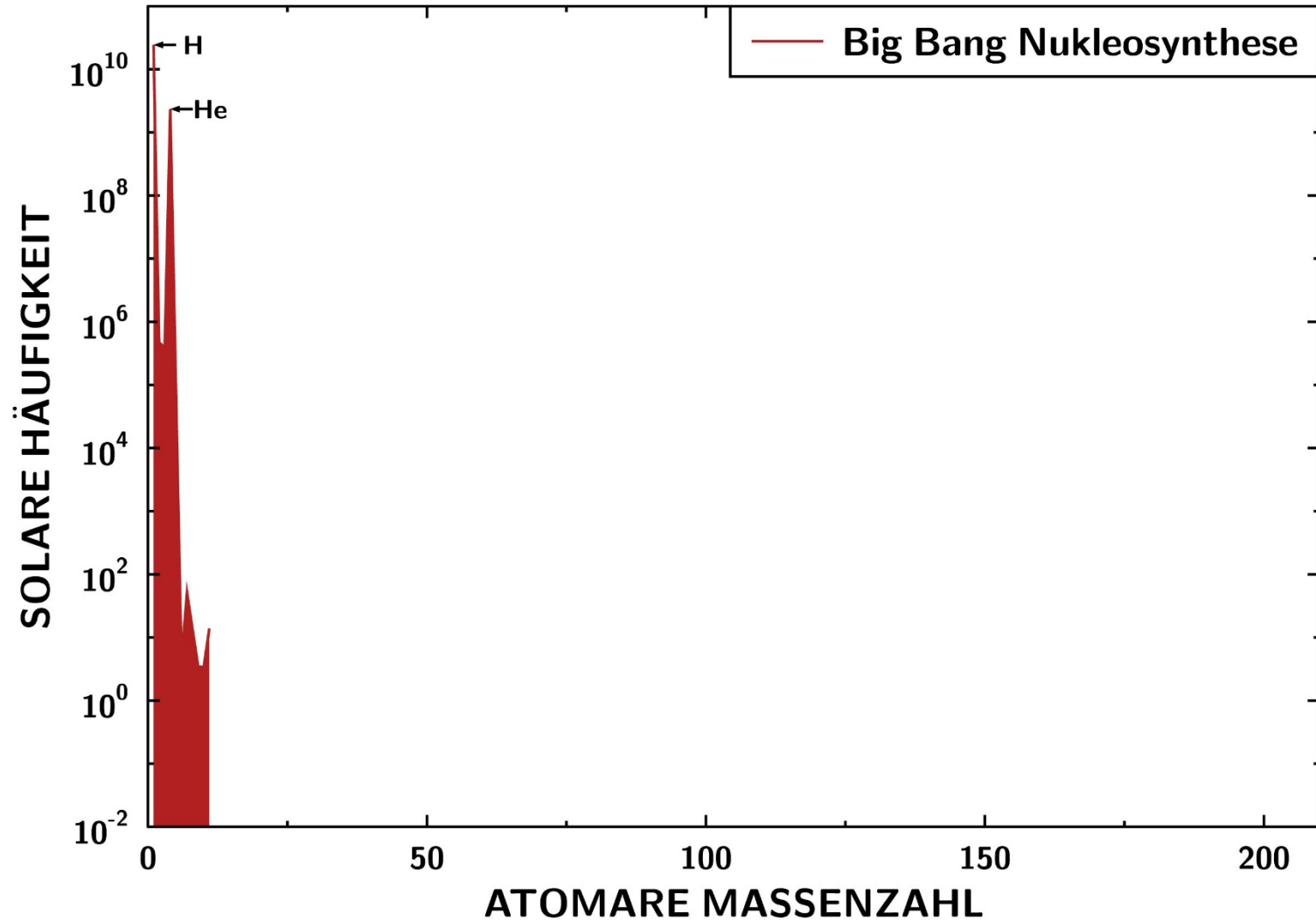


-> **homogene Ausdehnung**

Urknall – Big Bang

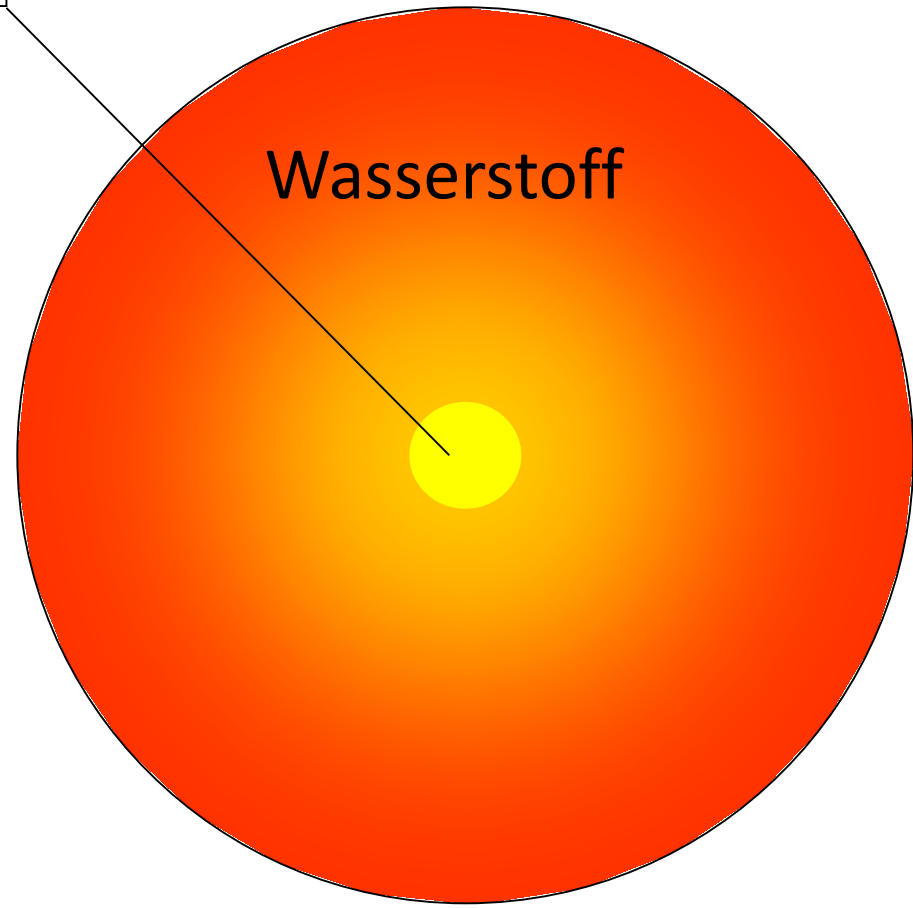
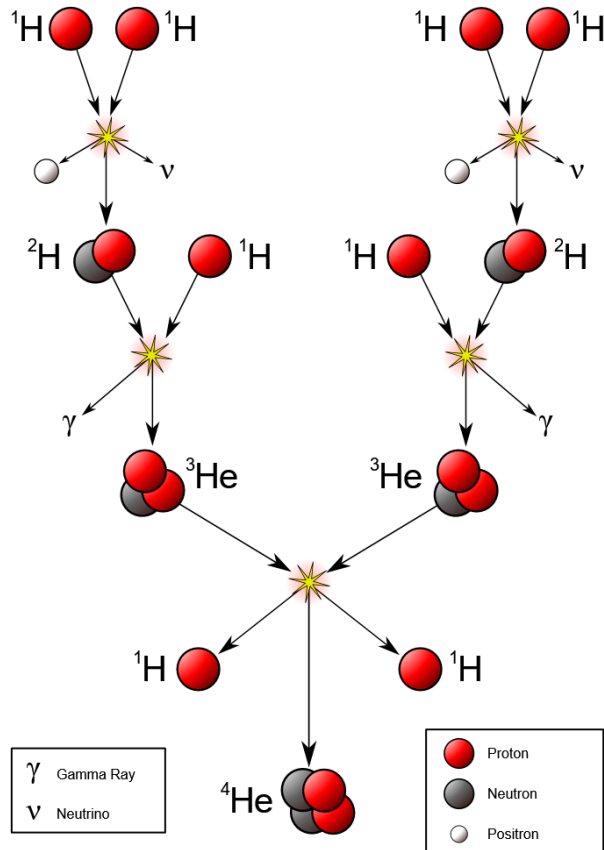


Erste Elemente – H, He

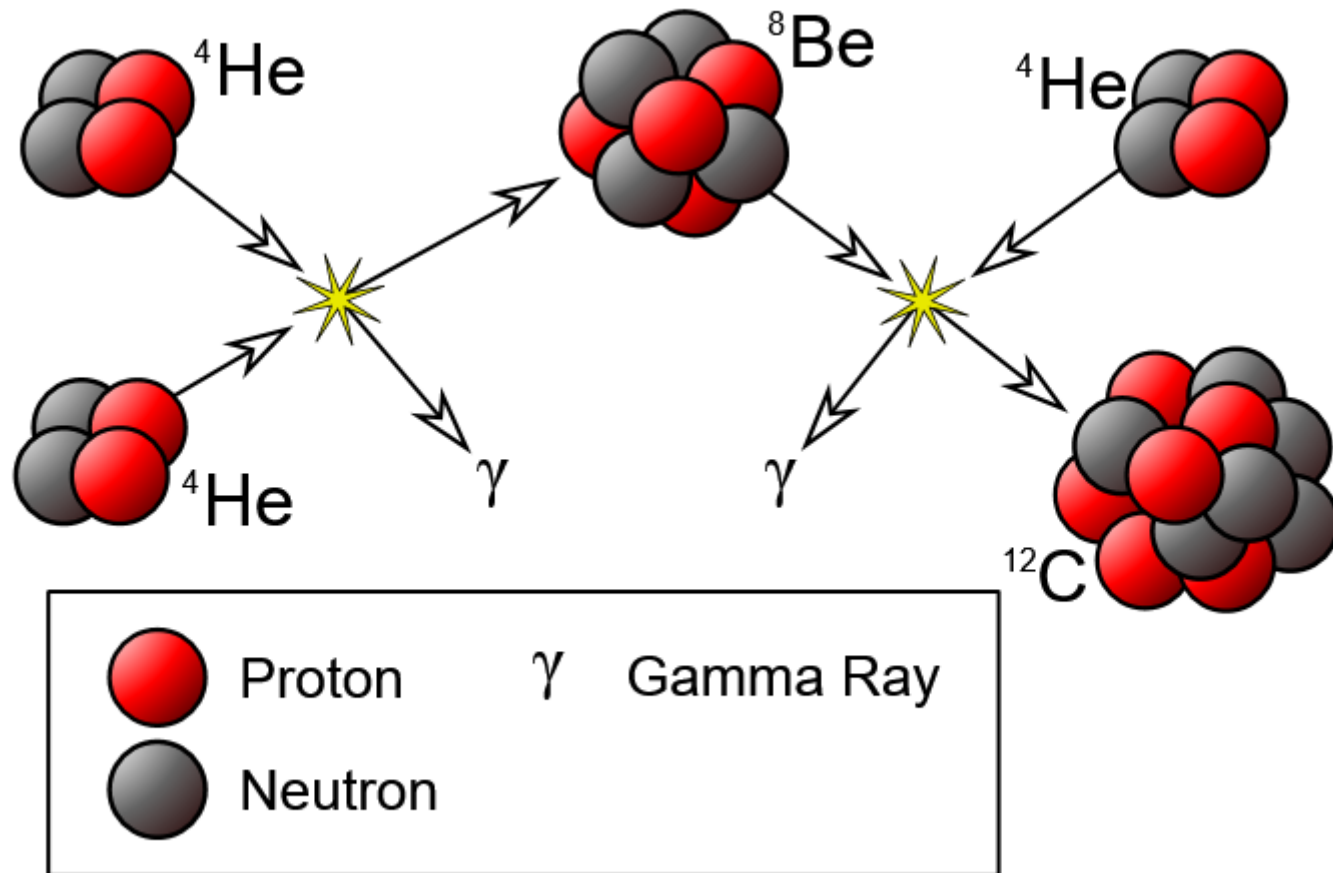


Erste Sterne nach 500 Millionen Jahren

Wasserstoffkernbrennen

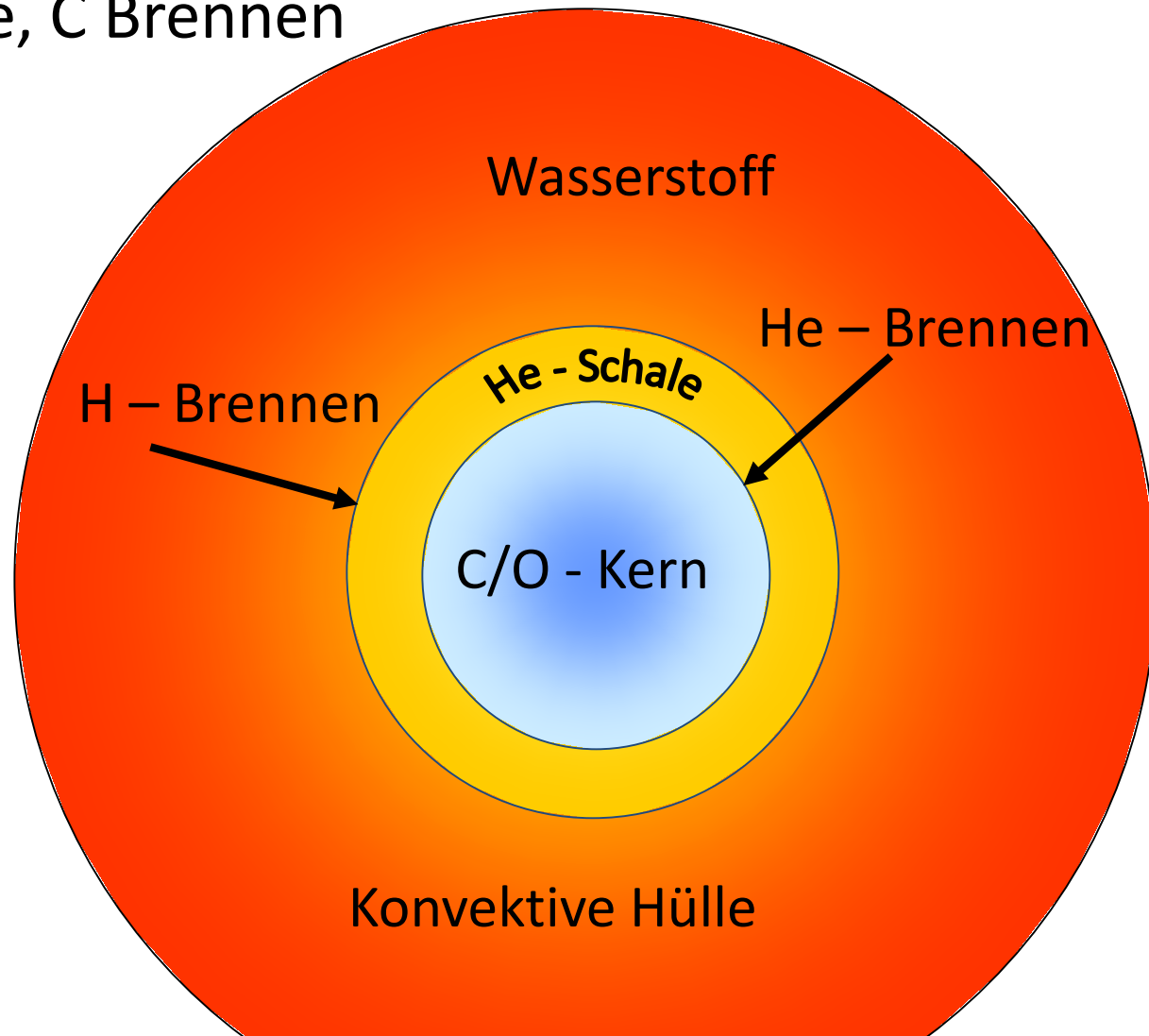


Triple-Alpha-Prozess

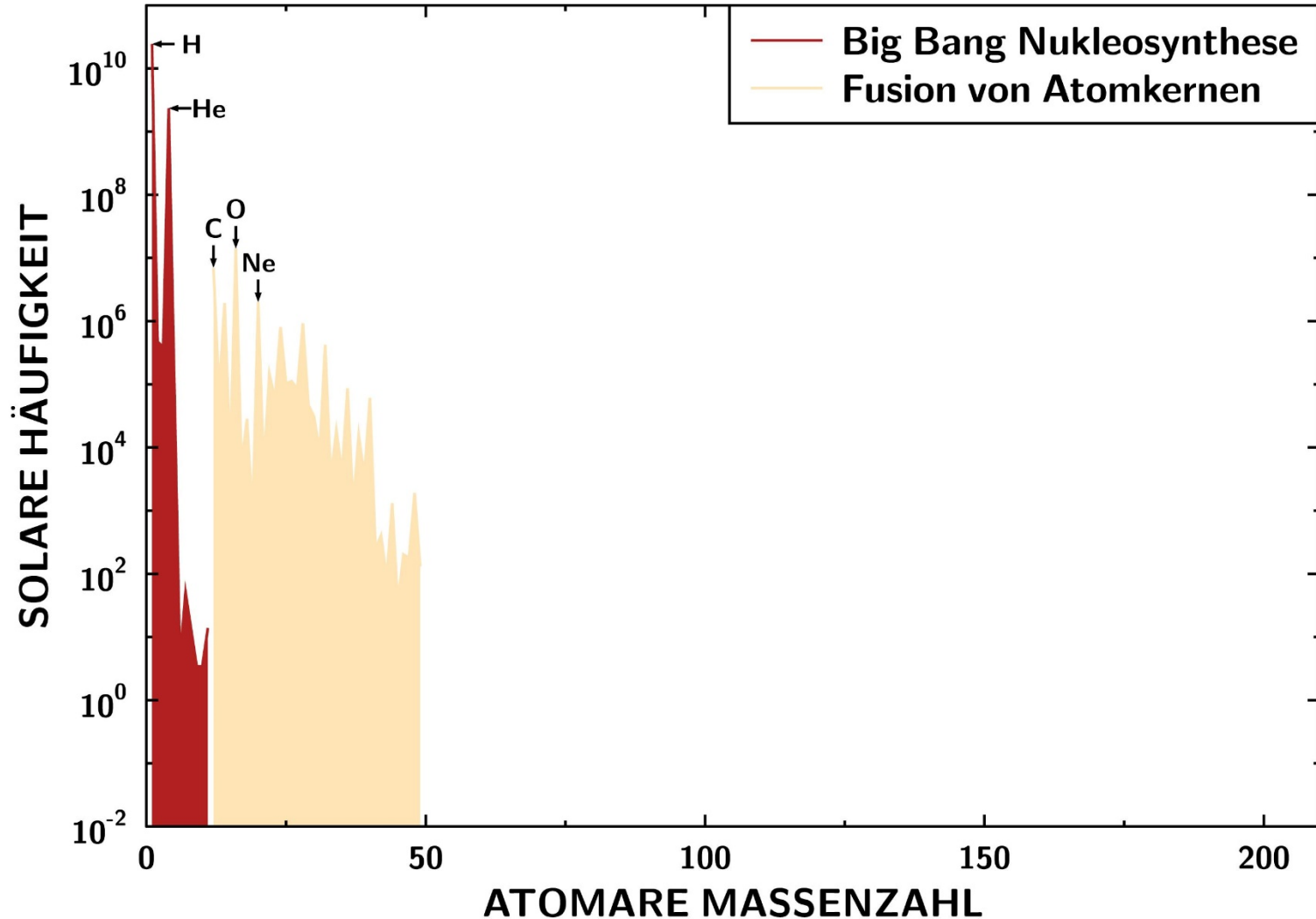


Zwiebelschalenstruktur

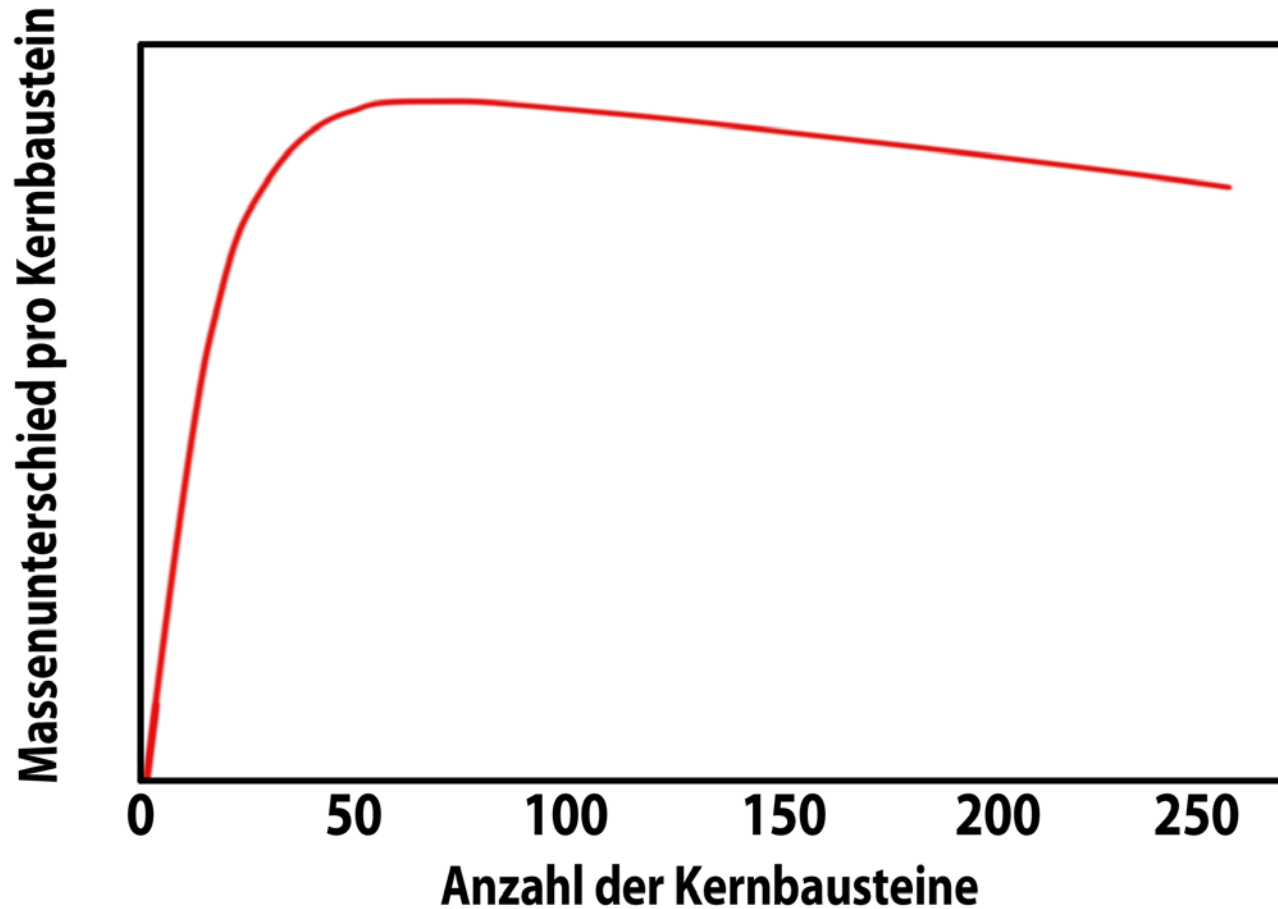
Spätere Stadien: H, He, C Brennen



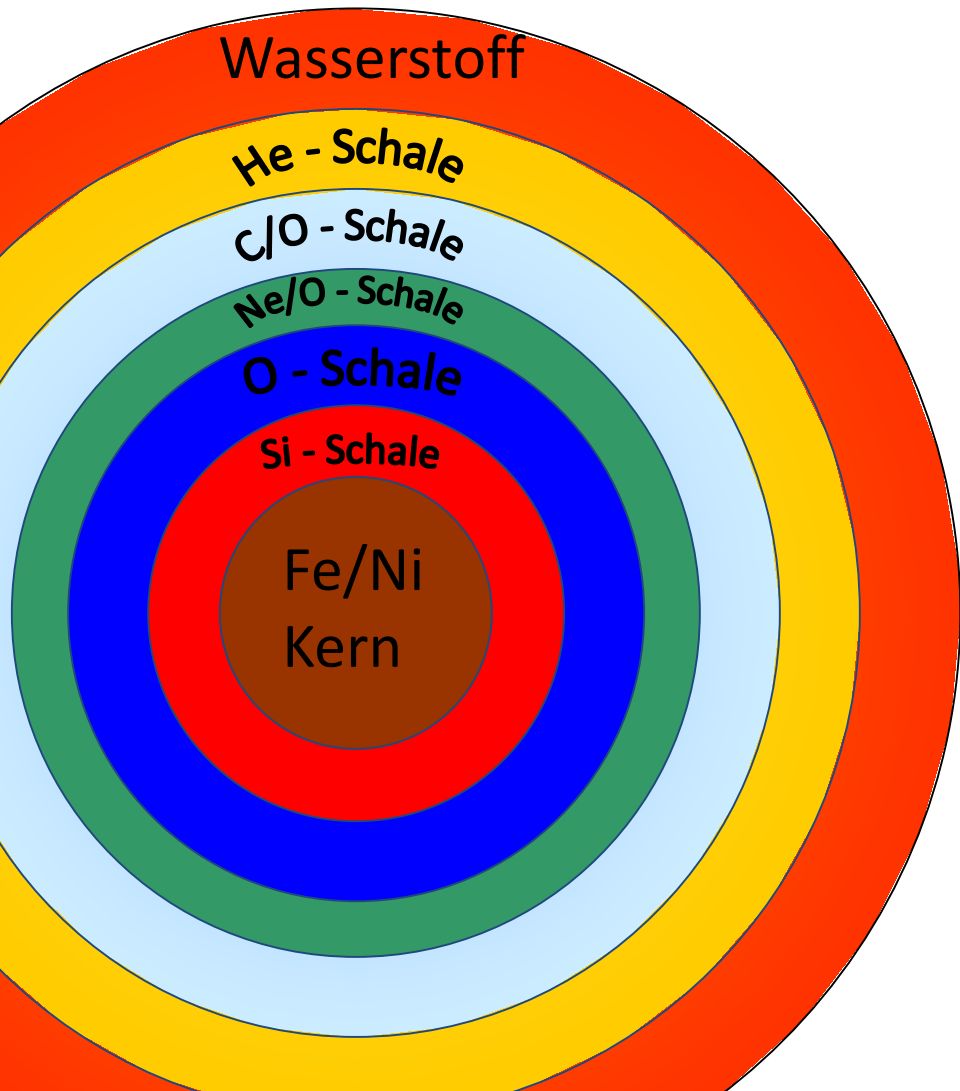
Energiequelle der Sterne



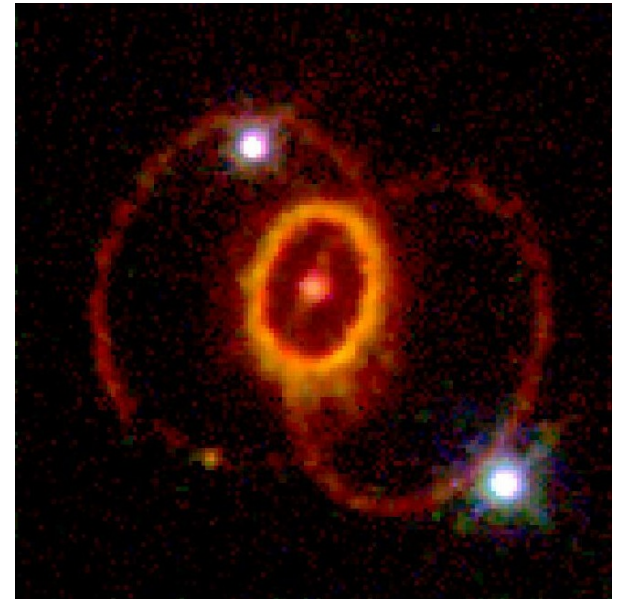
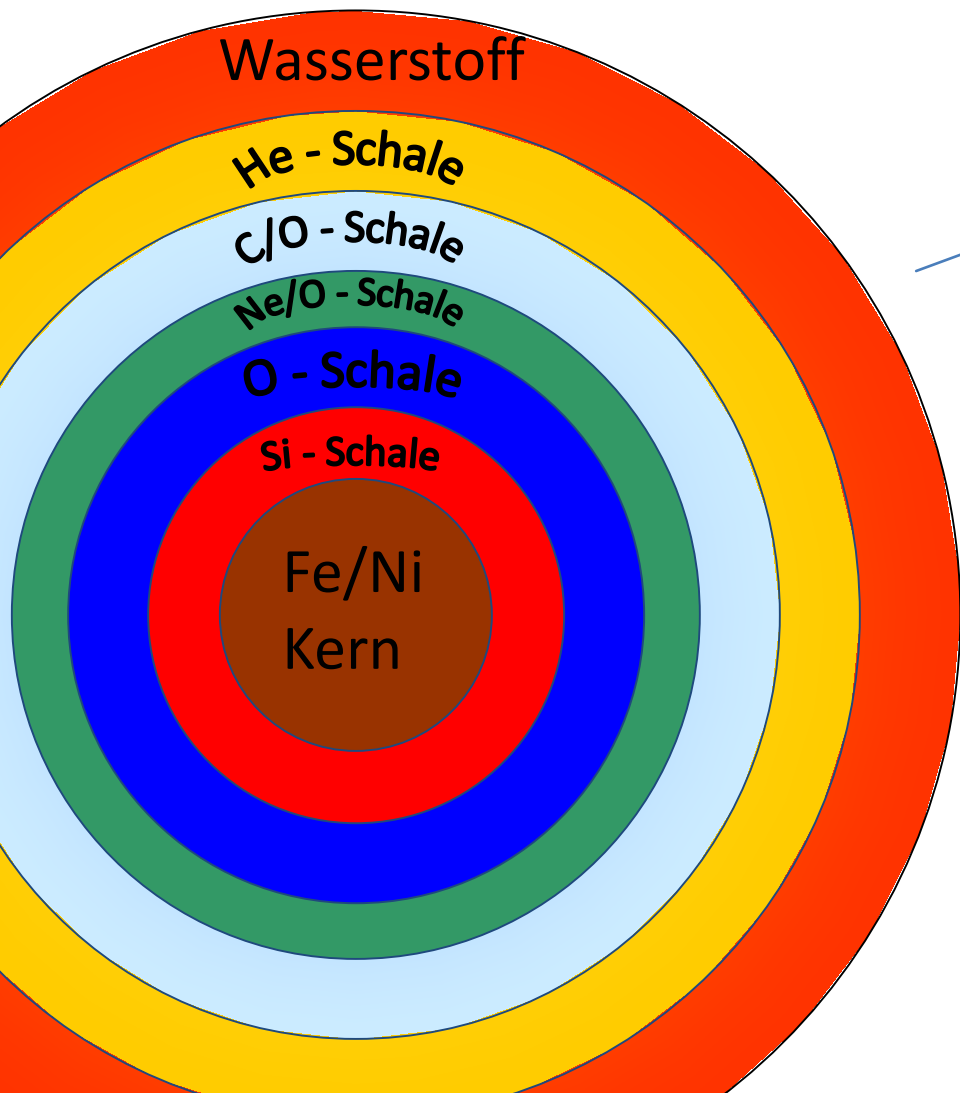
Nukleare Bindungsenergie



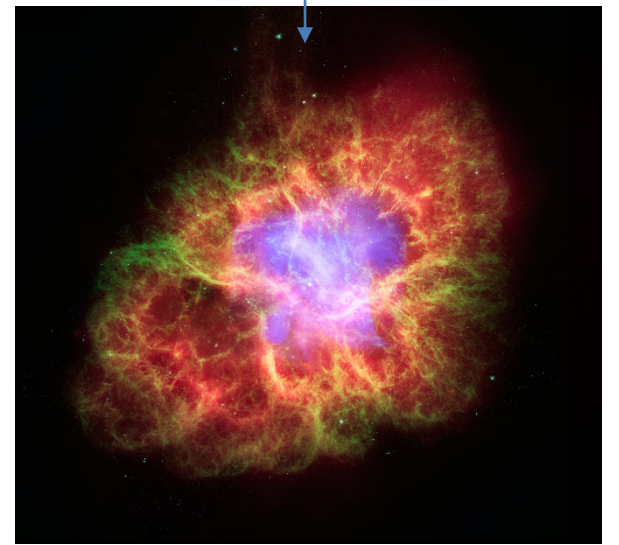
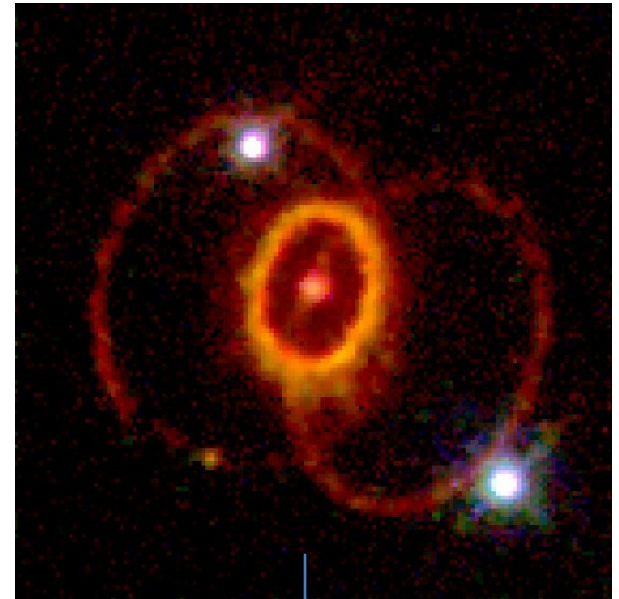
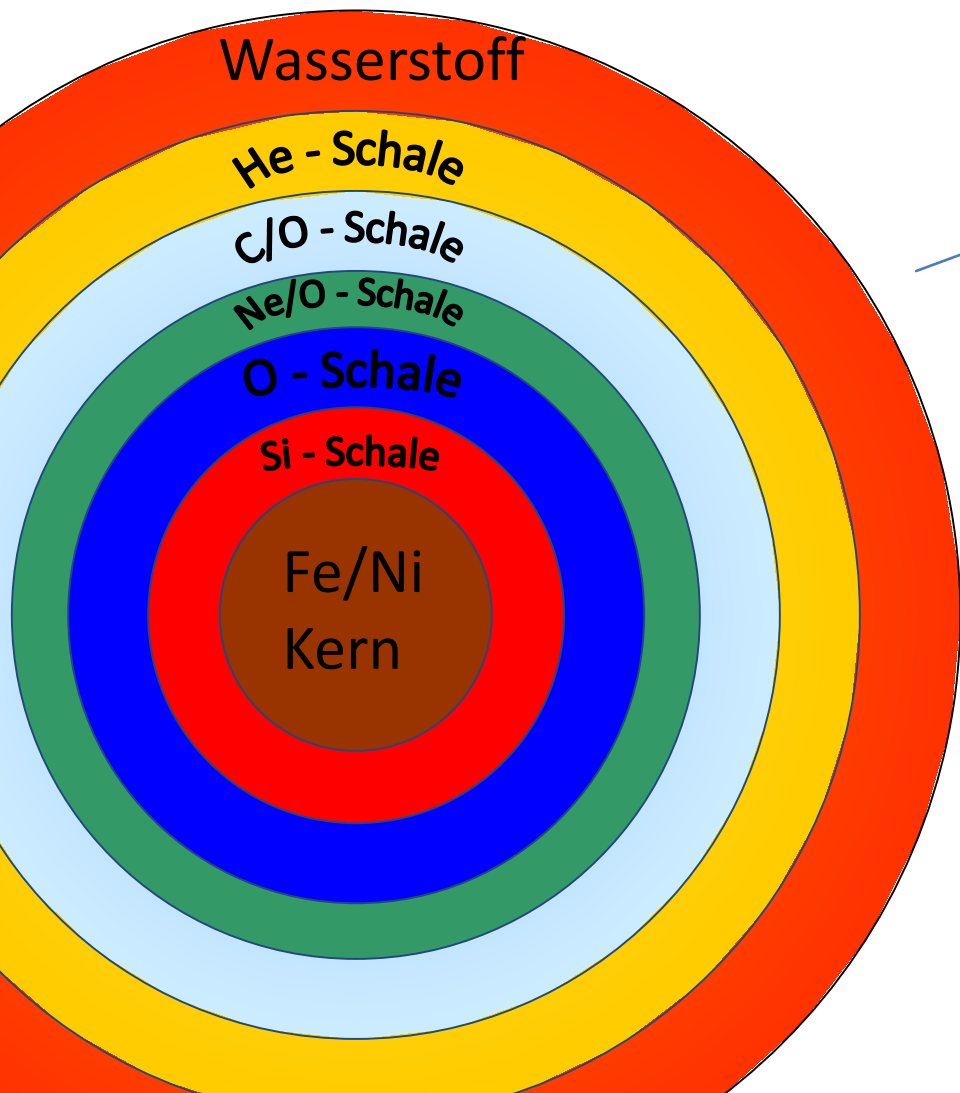
Schwere Sterne – frühes Ende



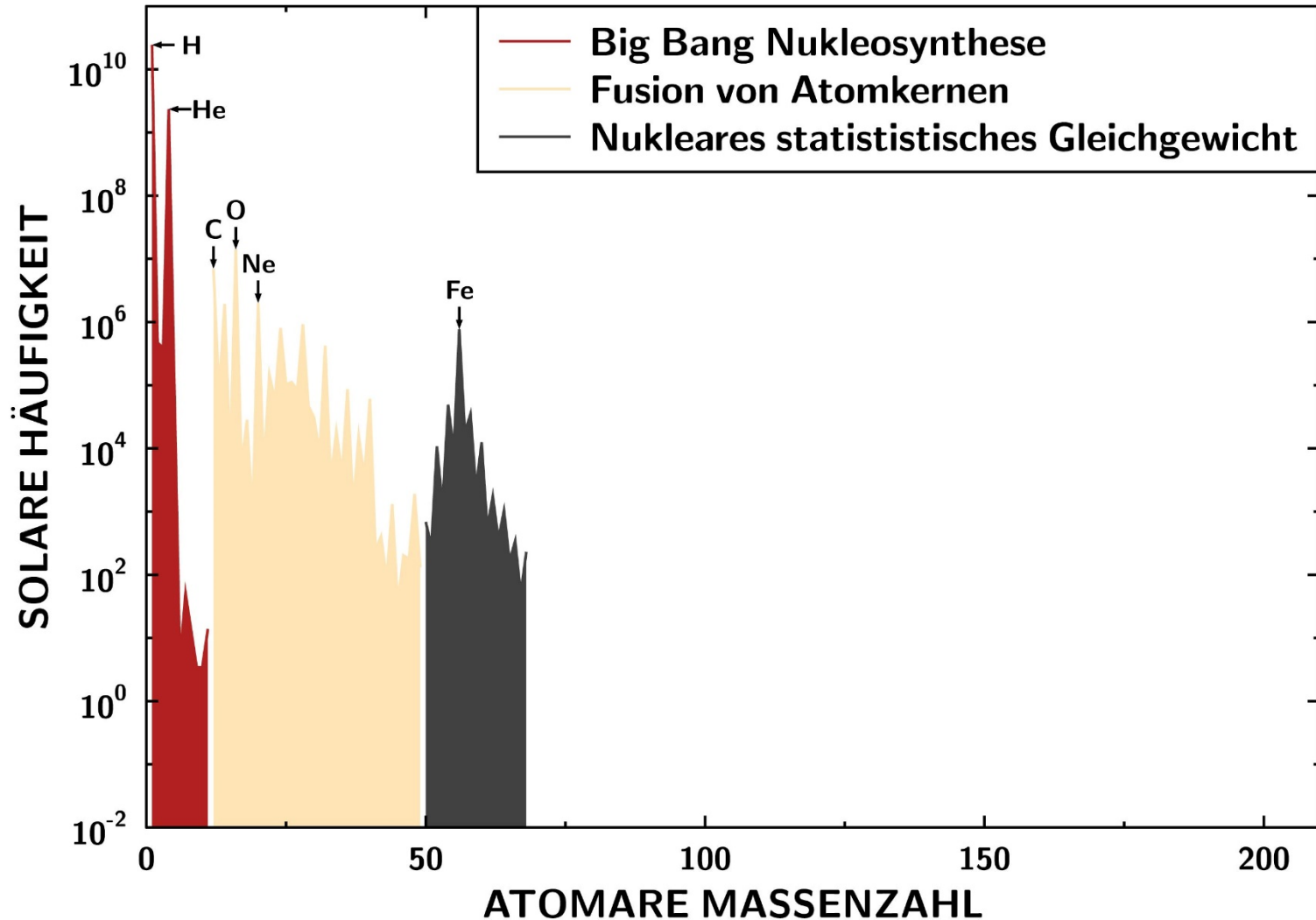
Schwere Sterne – frühes Ende



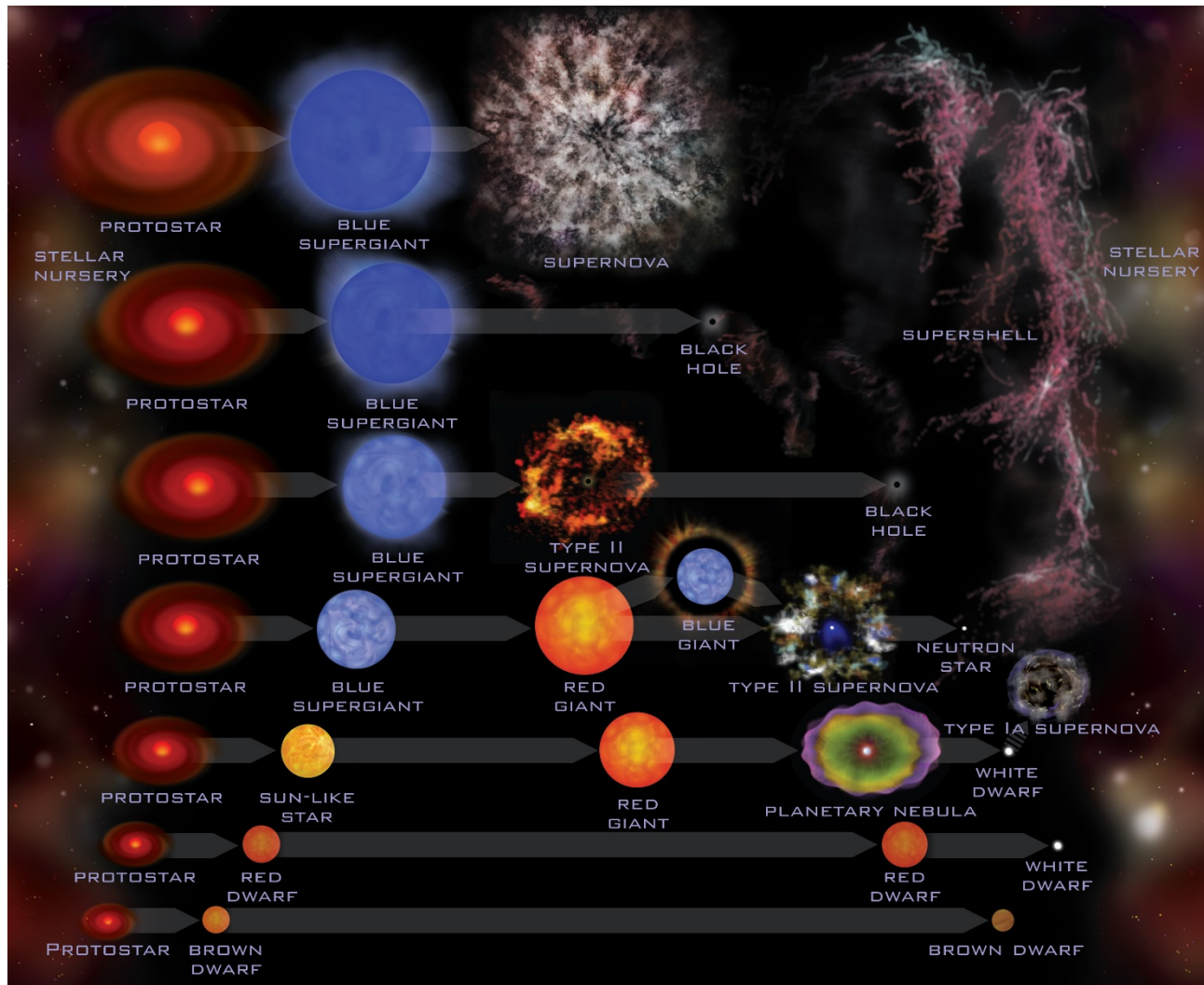
Schwere Sterne – frühes Ende



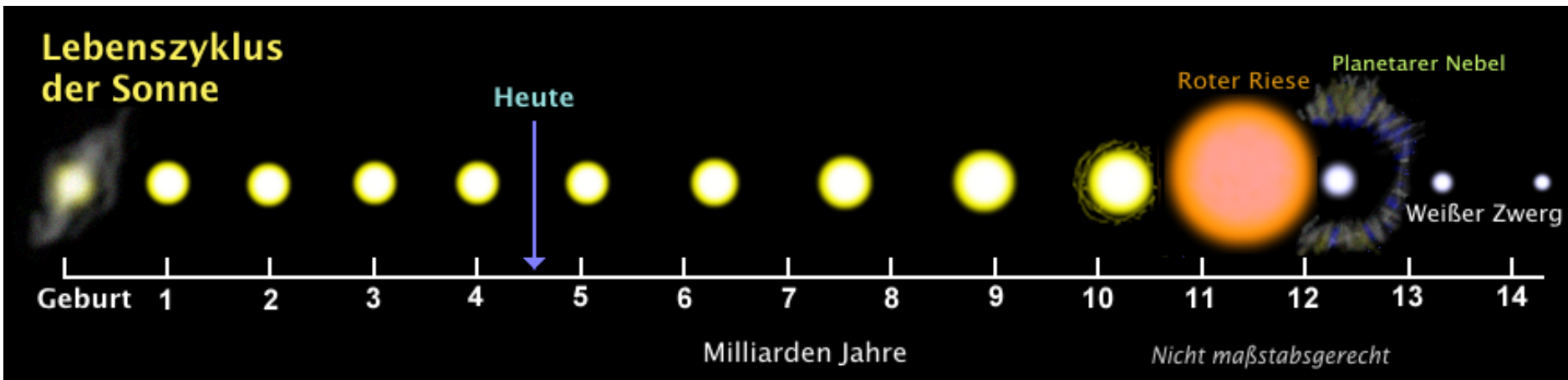
Eisen – die stabilsten überleben



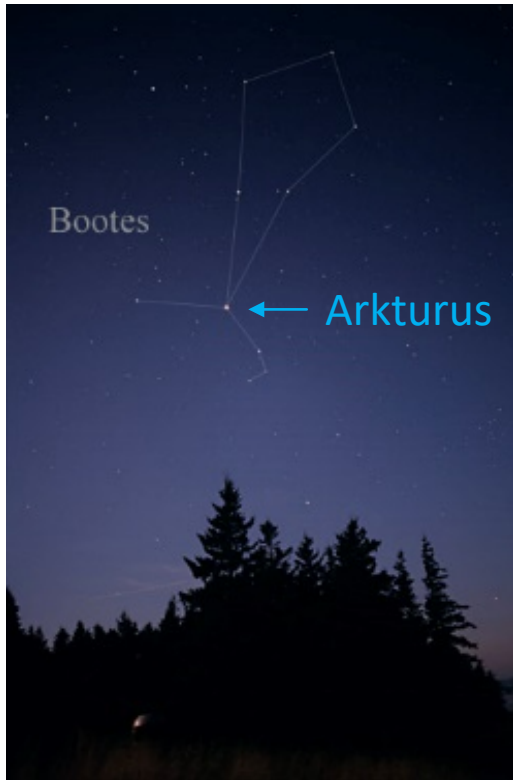
Masse bestimmt Schicksal



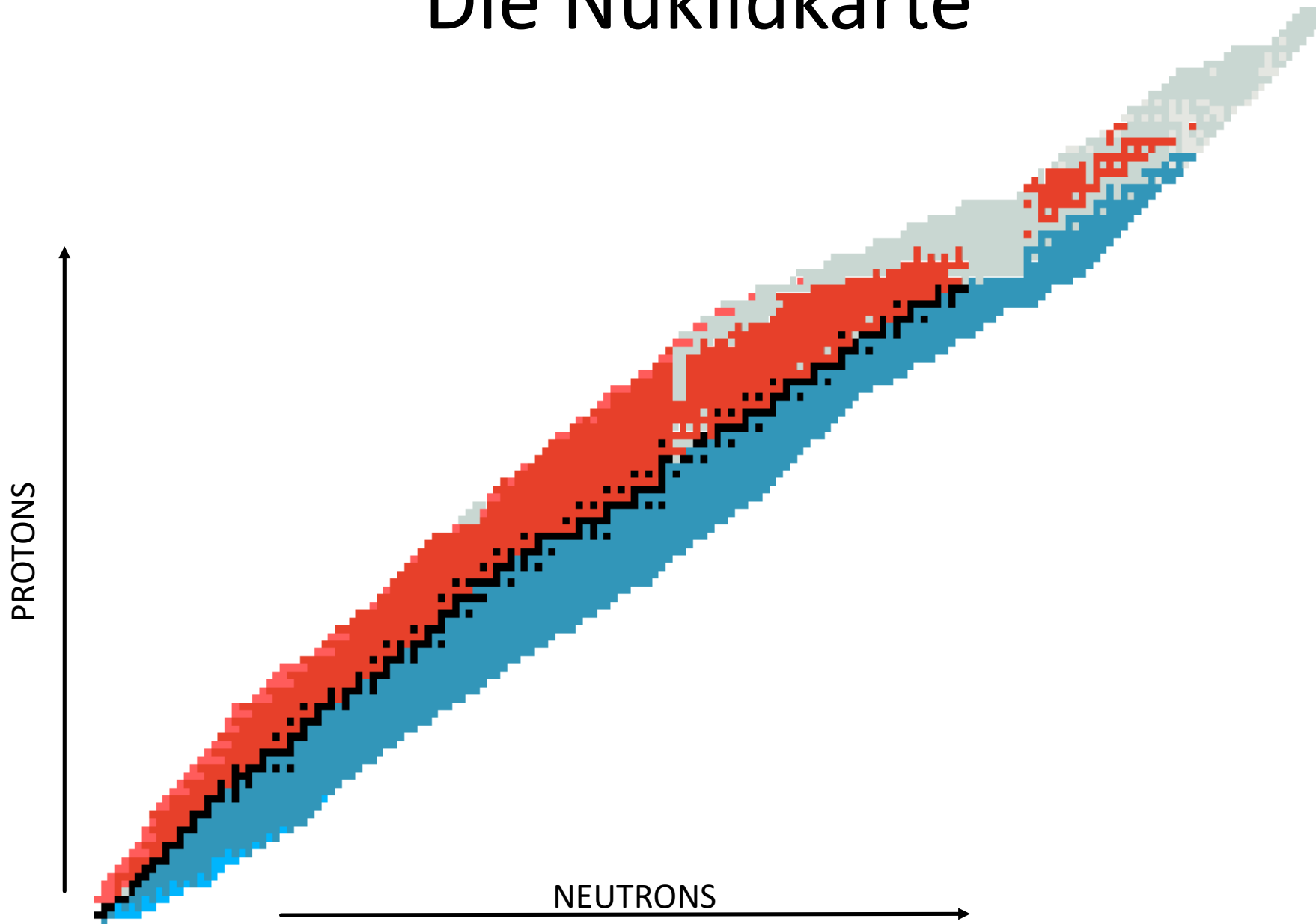
Das Schicksal der Sonne



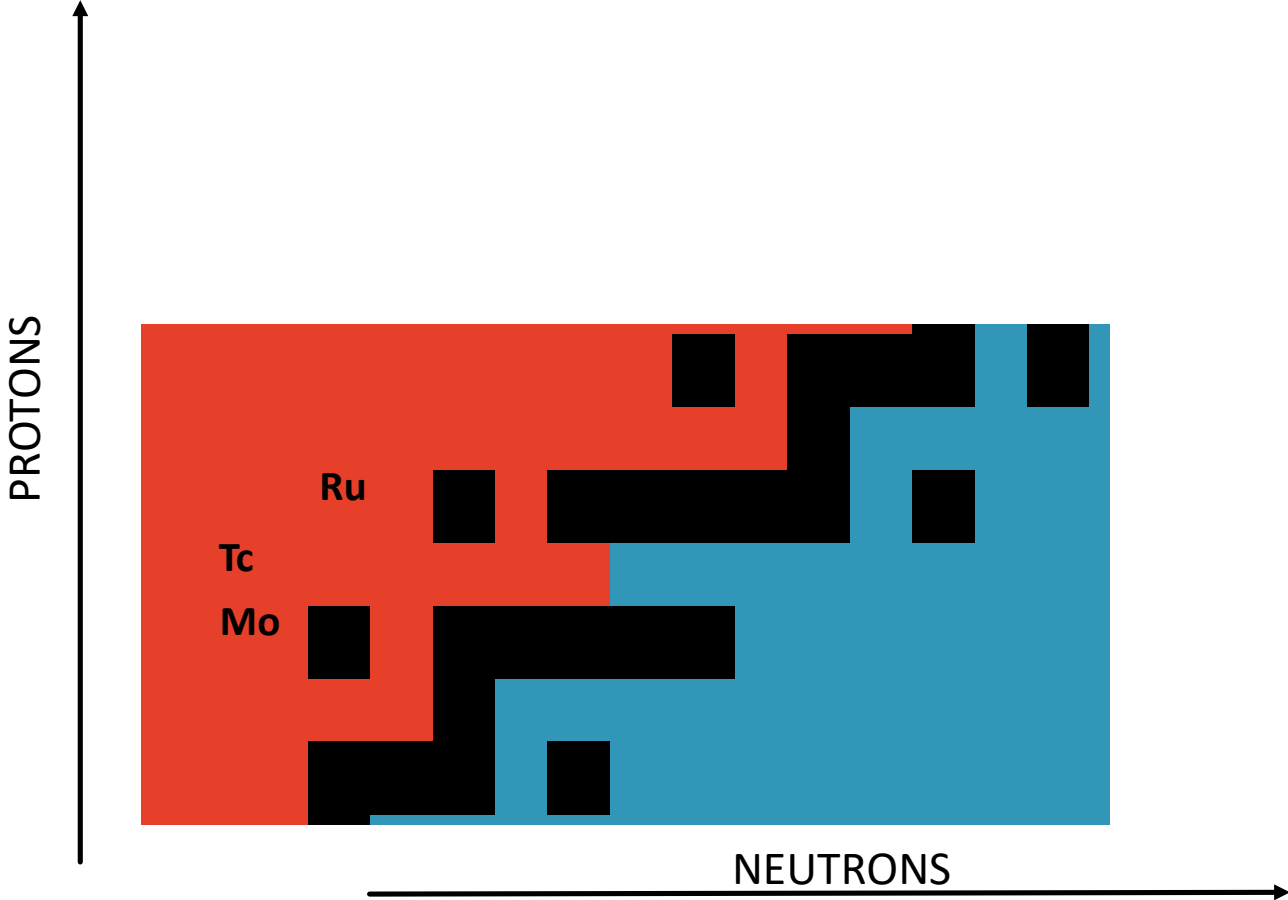
Das Geheimnis der Roten Riesen



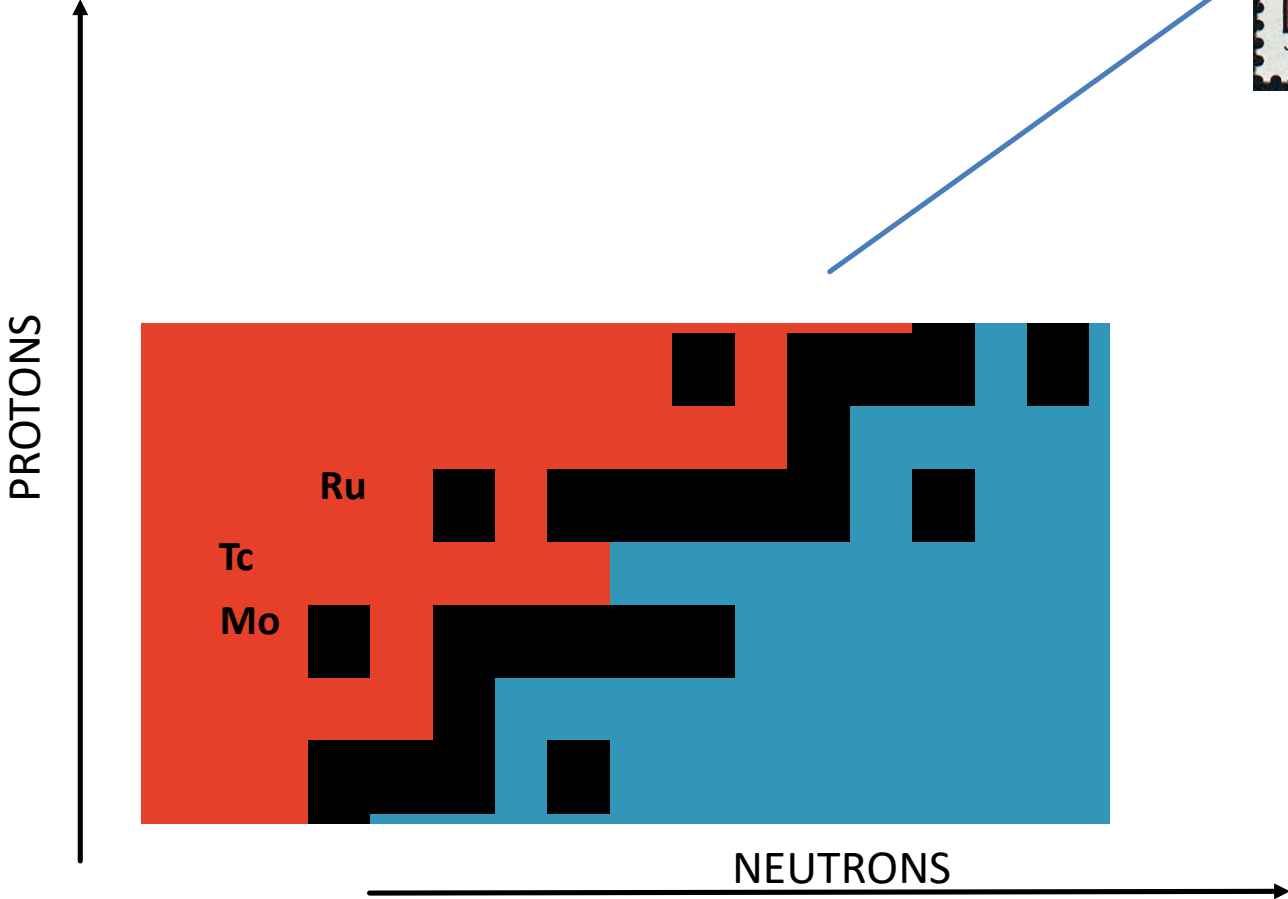
Die Nuklidkarte



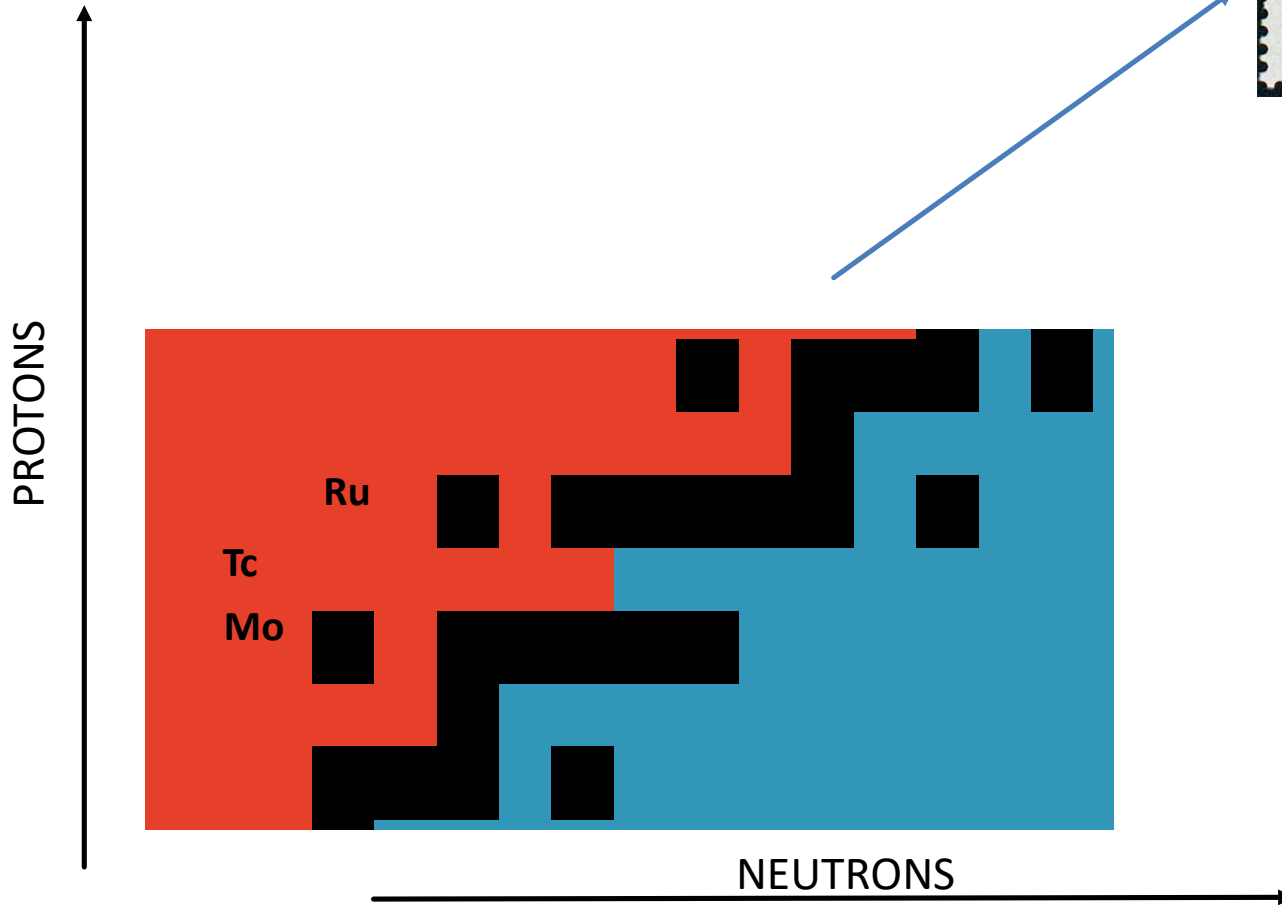
Technetium in Roten Riesen



Technetium in Roten Riesen

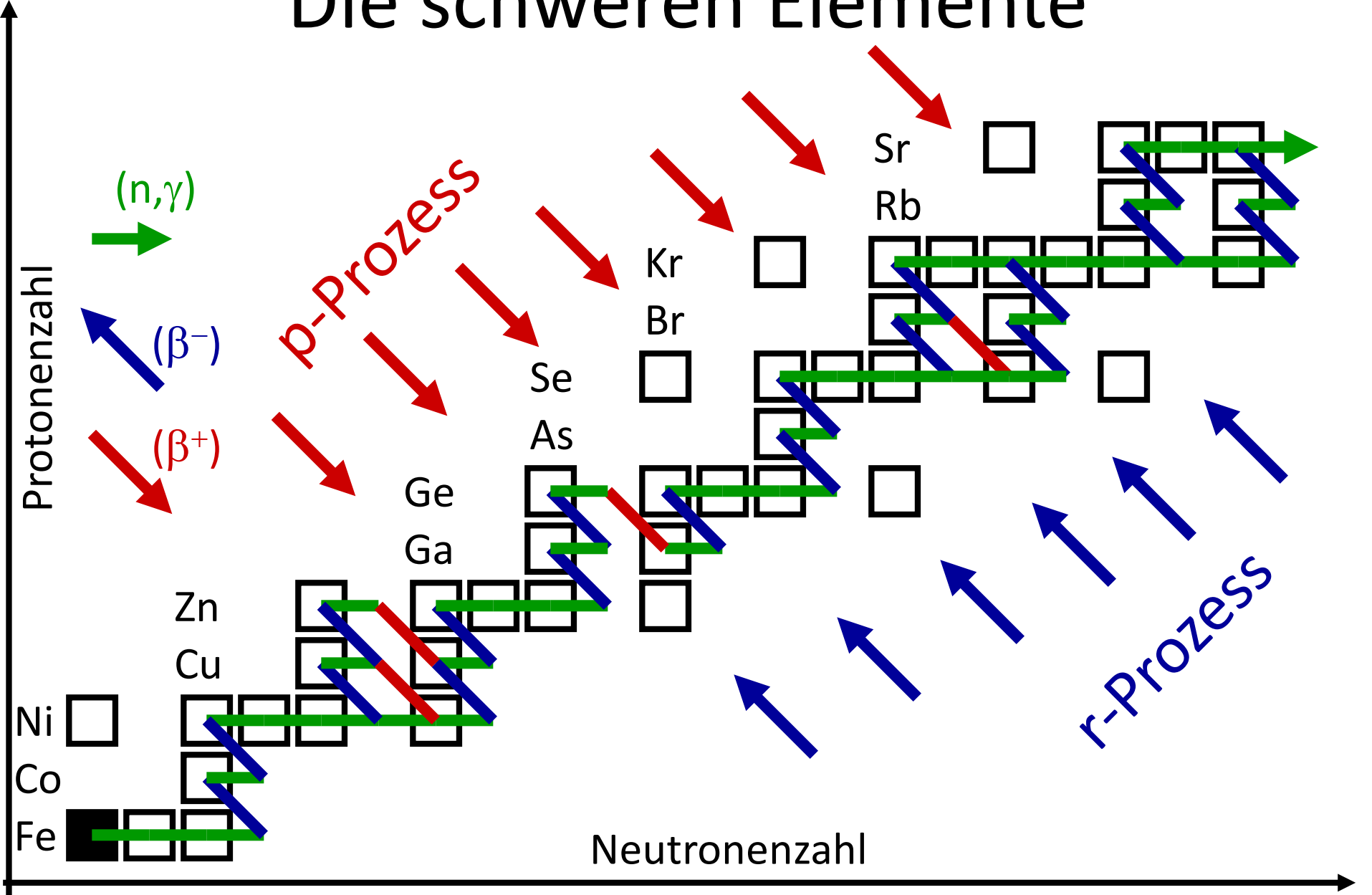


Technetium in Roten Riesen

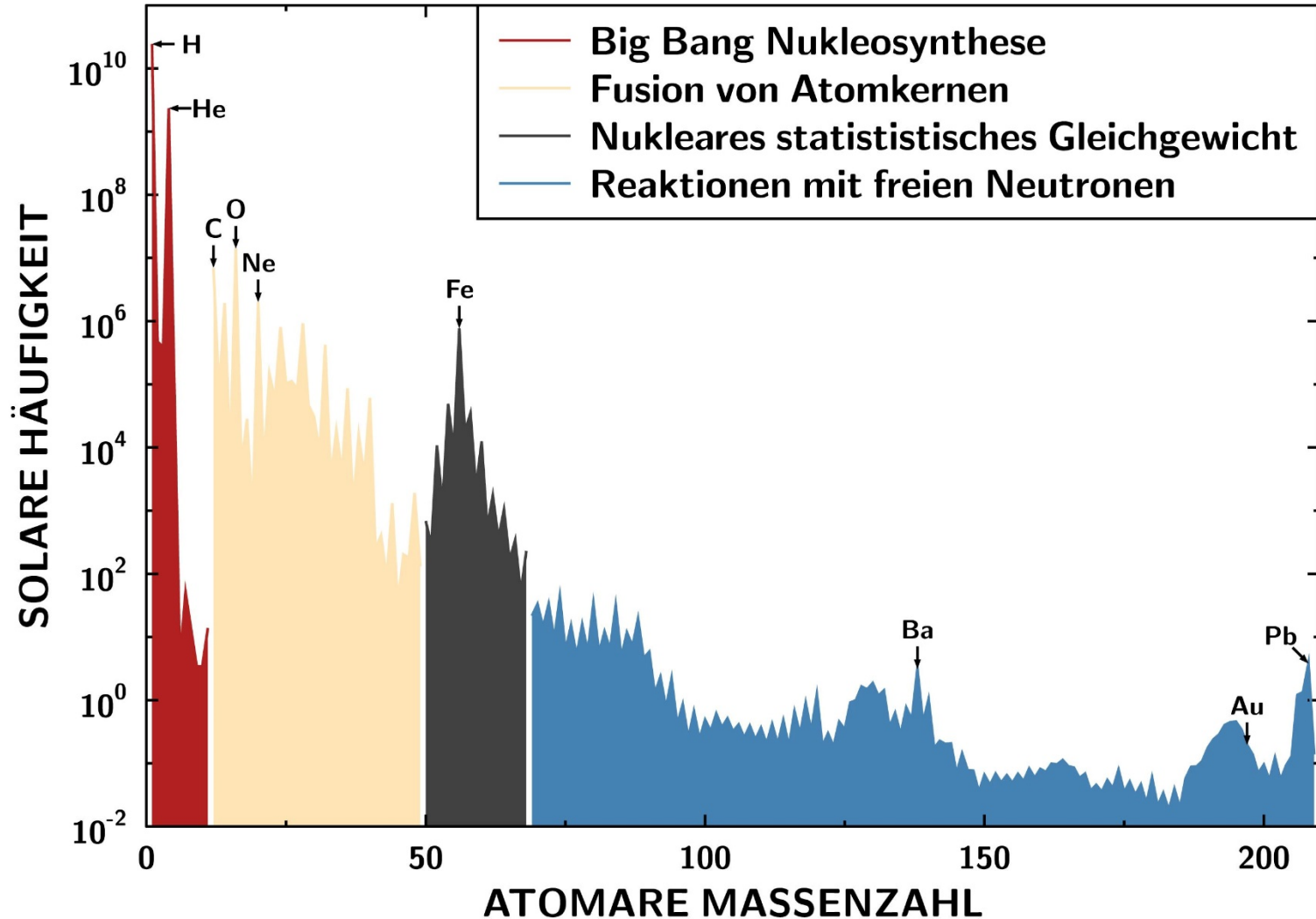


**Sterne
produzieren die
schweren
Elemente!**

Die schweren Elemente

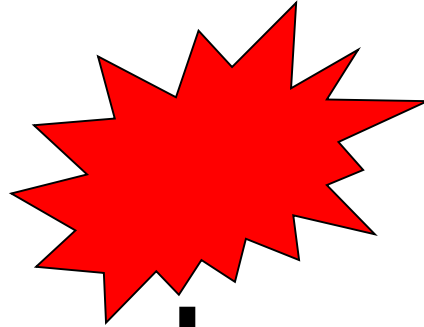


Die Entstehung der Elemente



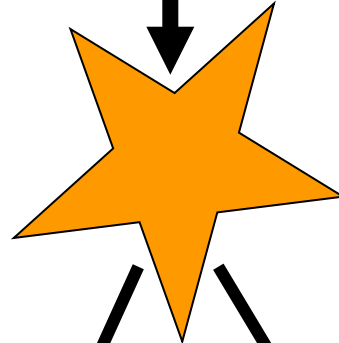
Kosmisches Recycling

Urknall



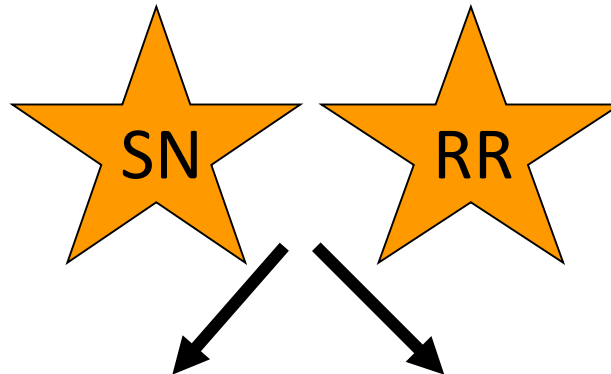
H, He, Li

Erste Generation
von (schweren)
Sternen



C ... Fe
Eisengruppe, einige
schwere Elemente

Spätere Stern-
generationen

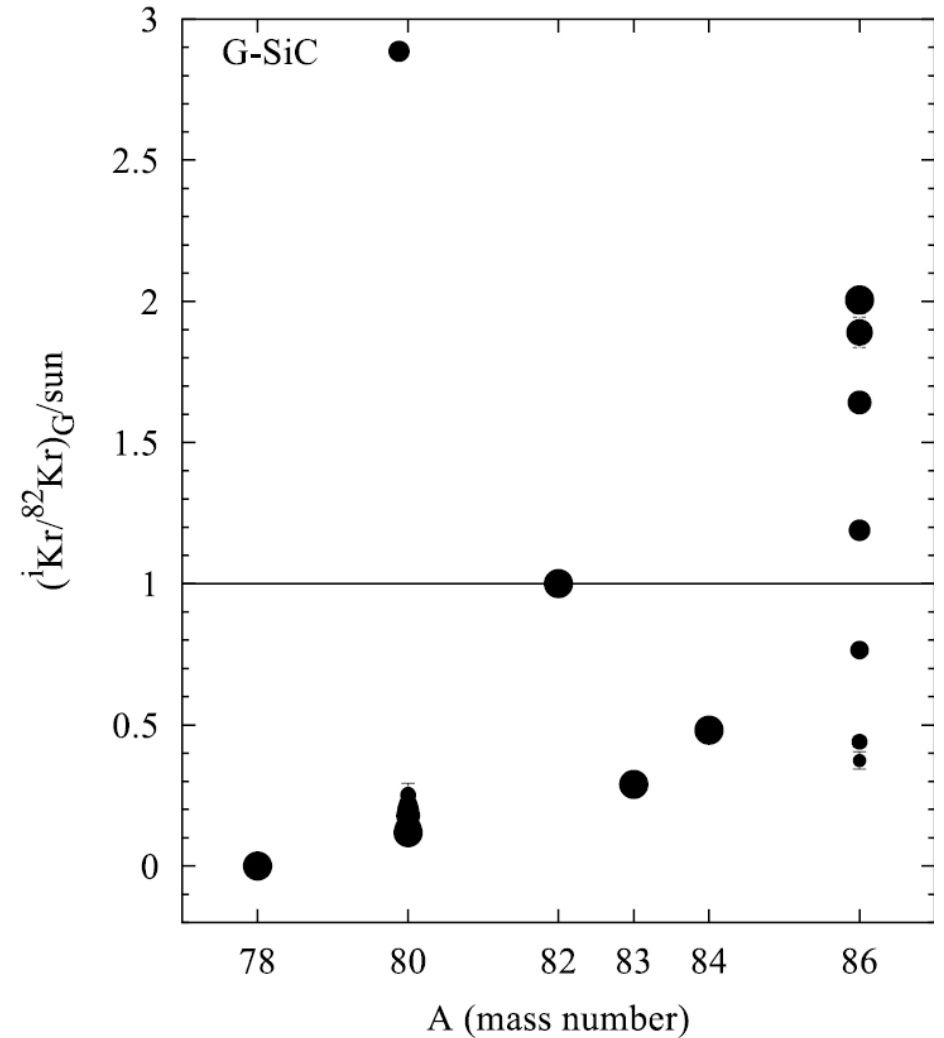


C ... Fe
Eisengruppe,
weitere
schwere Elemente

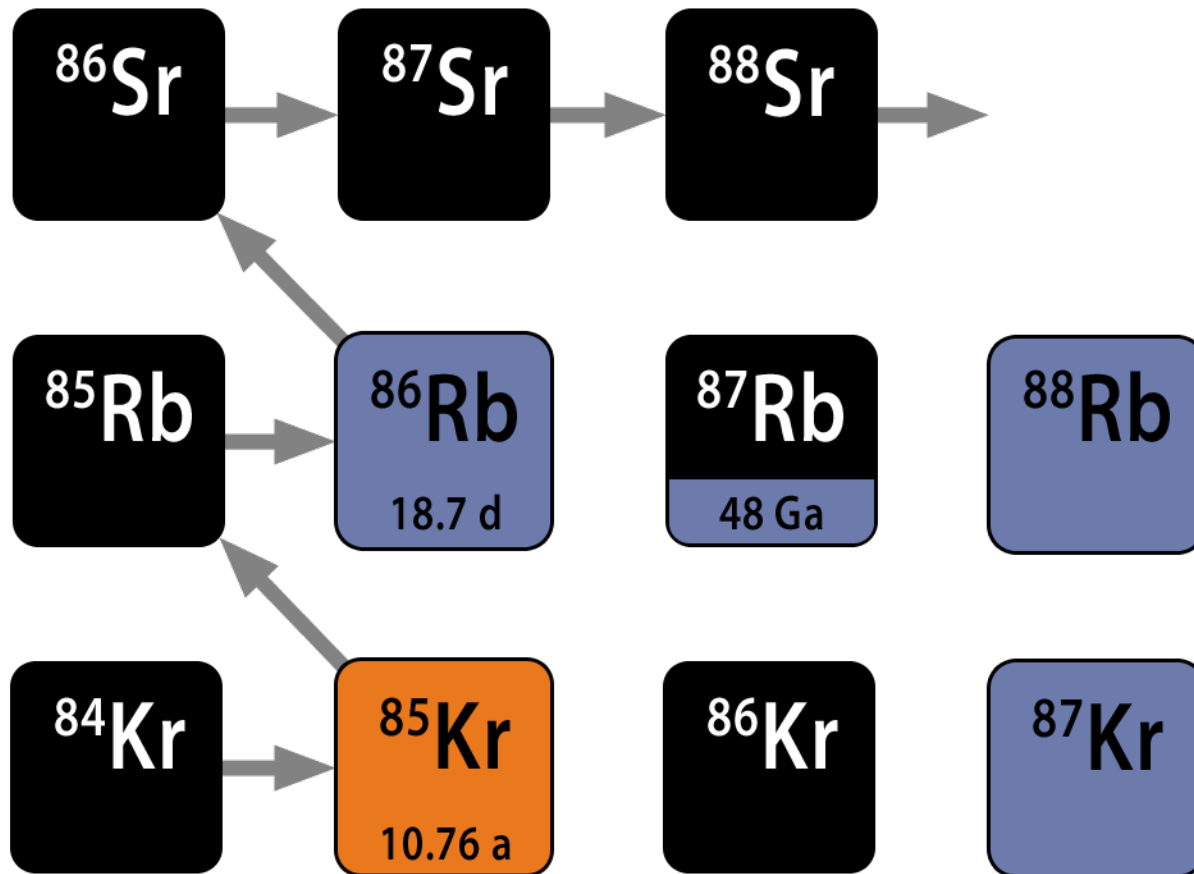
Meteoriten und kosmischer Staub



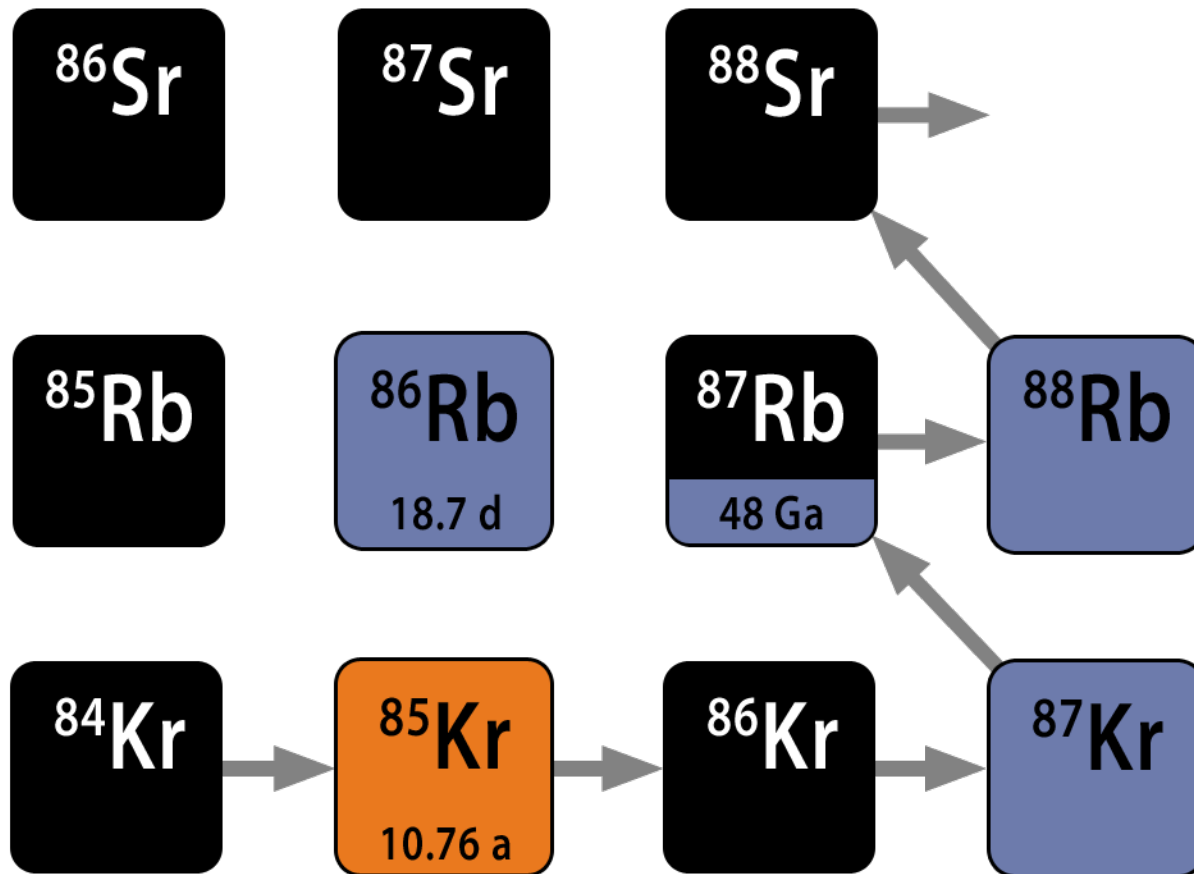
Meteoriten und kosmischer Staub



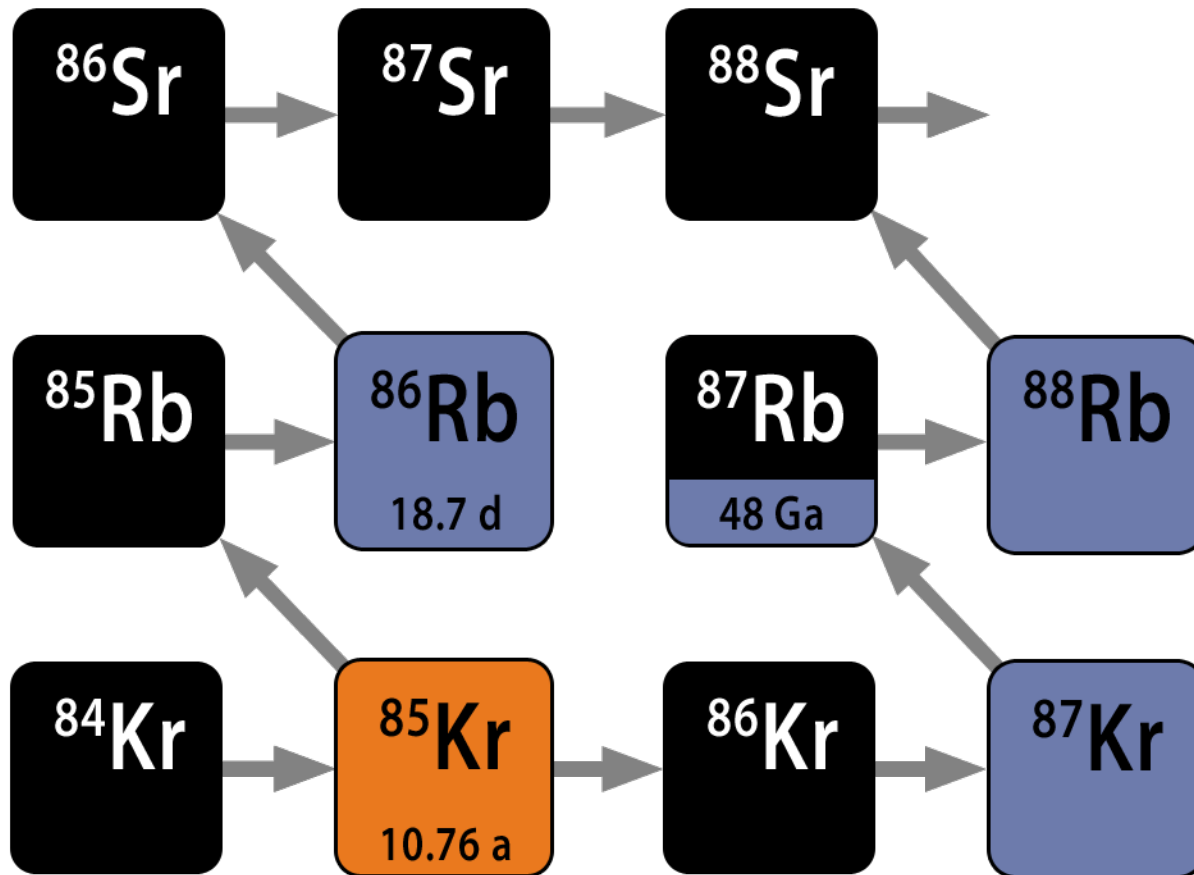
Verzweigungen im Pfad



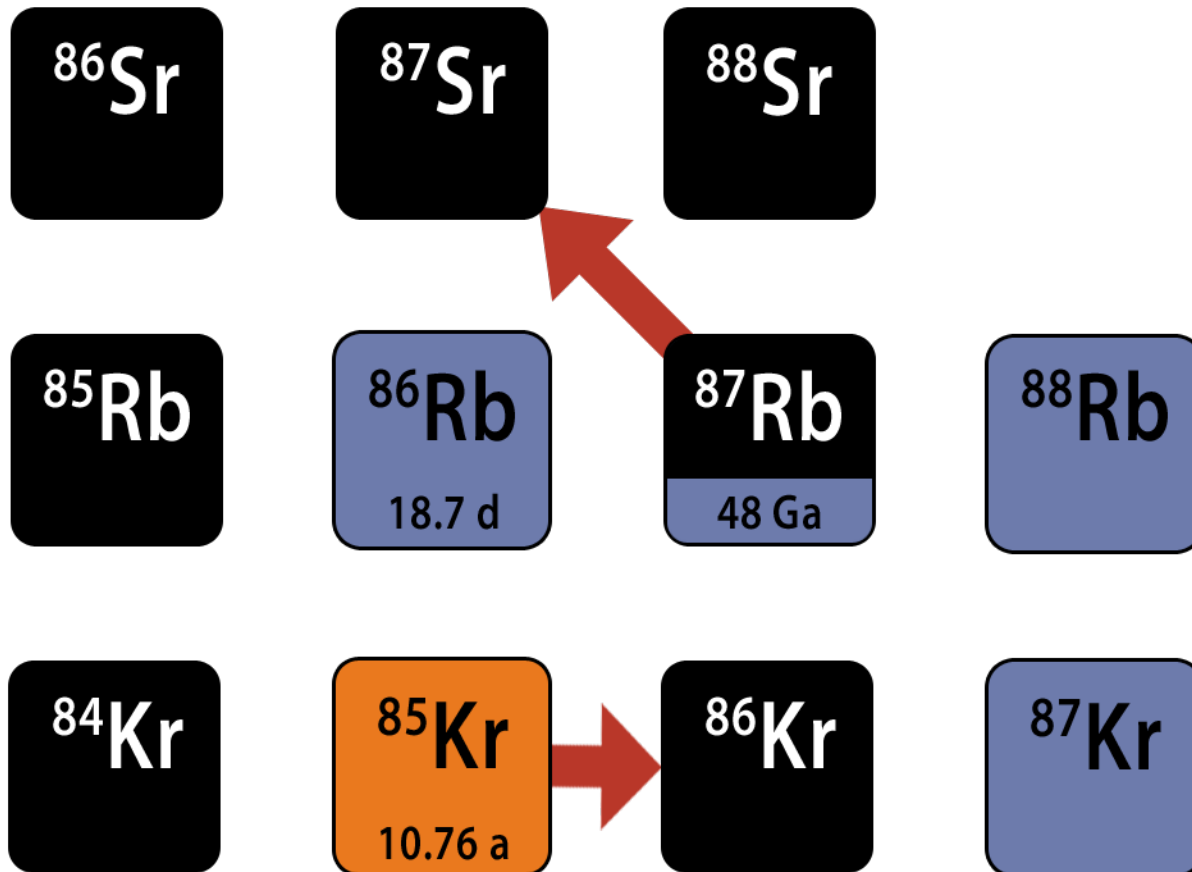
Verzweigungen im Pfad



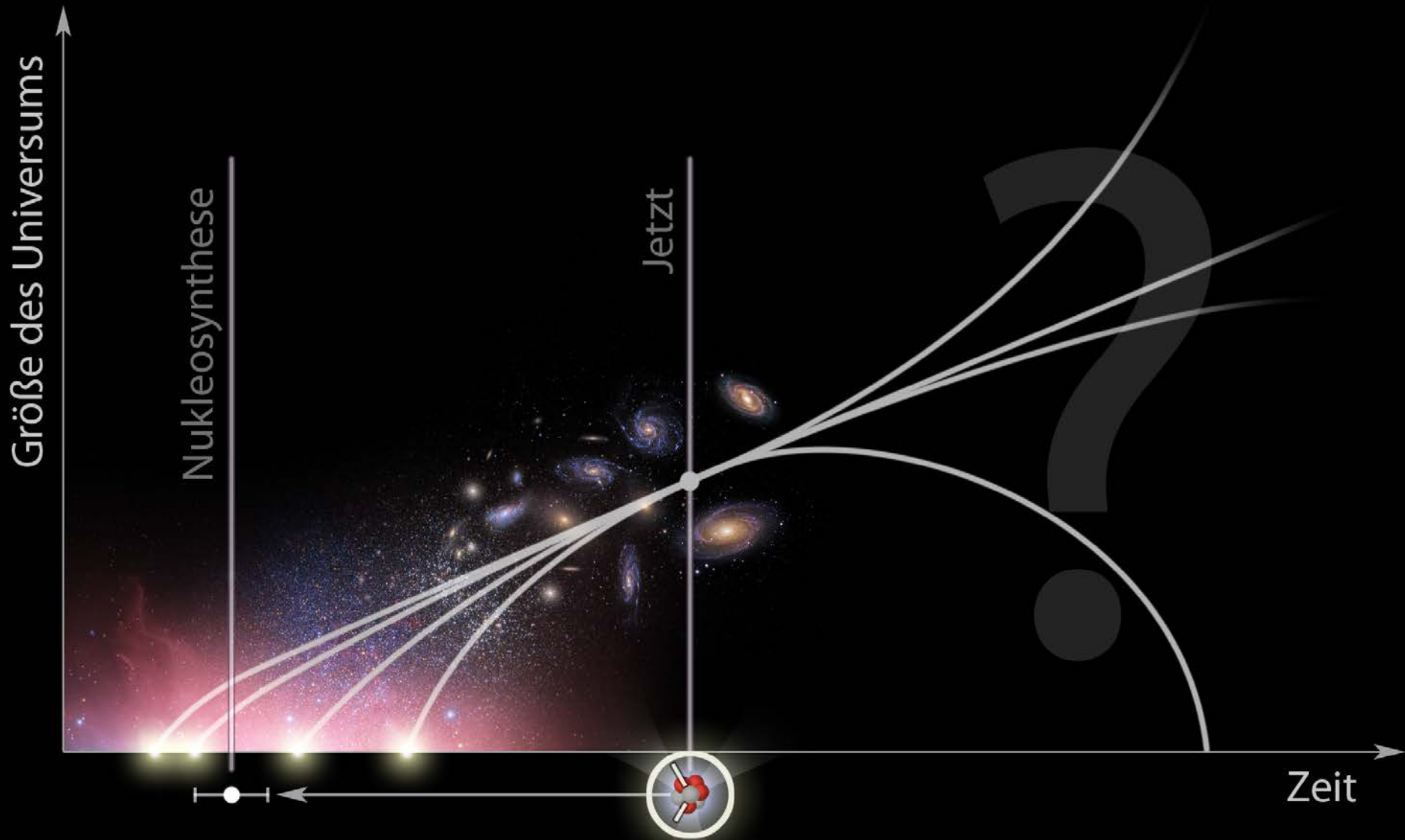
Verzweigungen im Pfad



Wichtigste Unbekannte: Neutroneneinfang am ^{85}Kr



Wann begann die Welt?



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