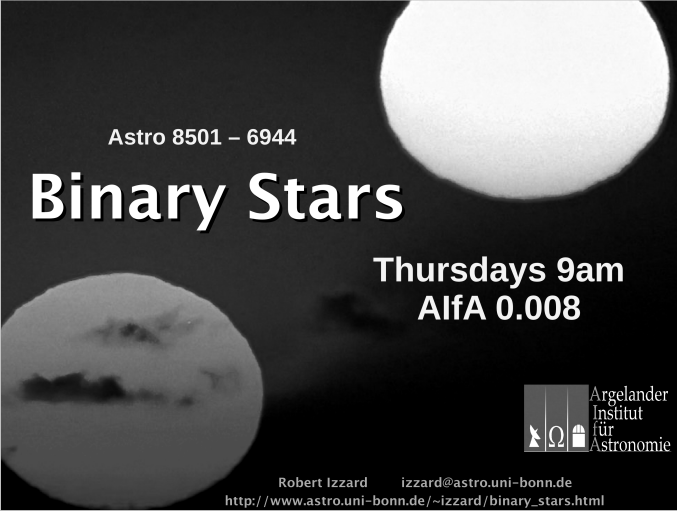


Astro 8501 – 6944

Binary Stars

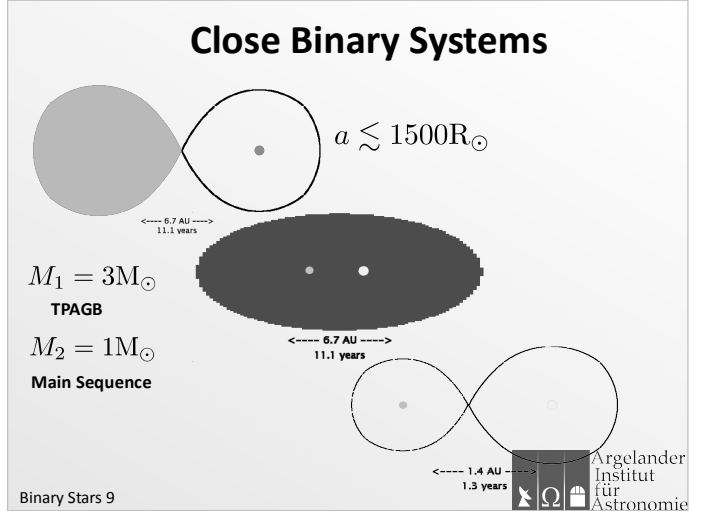
Thursdays 9am
Alfa 0.008



Robert Izzard izzard@astro.uni-bonn.de
http://www.astro.uni-bonn.de/~izzard/binary_stars.html

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Close Binary Systems



$M_1 = 3M_{\odot}$
TPAGB

$M_2 = 1M_{\odot}$
Main Sequence

$a \approx 1500R_{\odot}$

6.7 AU 11.1 years

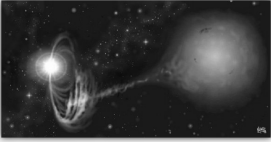
1.4 AU 1.3 years

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Cataclysms

- Classical novae
Thermonuclear explosion caused by pile-up of accreted matter
- Dwarf novae
Accretion disc instability
- Polars / Intermediate Polars
High B-field matter streams onto pole
- AM CVn white dwarf-white dwarf binary
- Supersoft X-ray sources

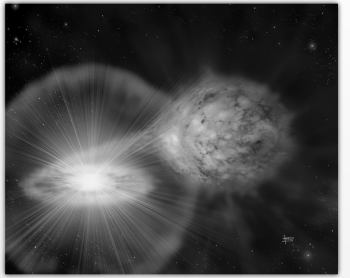


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Cataclysmic Variables

- White Dwarf +
- Low mass star
- WD accreting:
- Disc, outbursts etc.
- WD

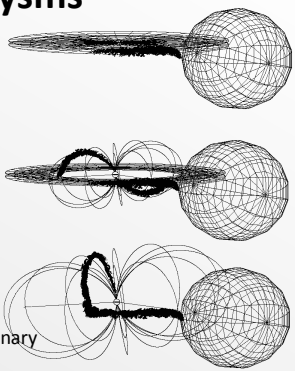


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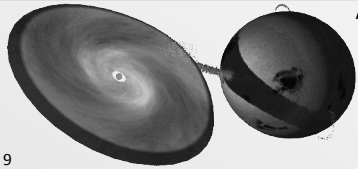
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Cataclysmic Binary Systems

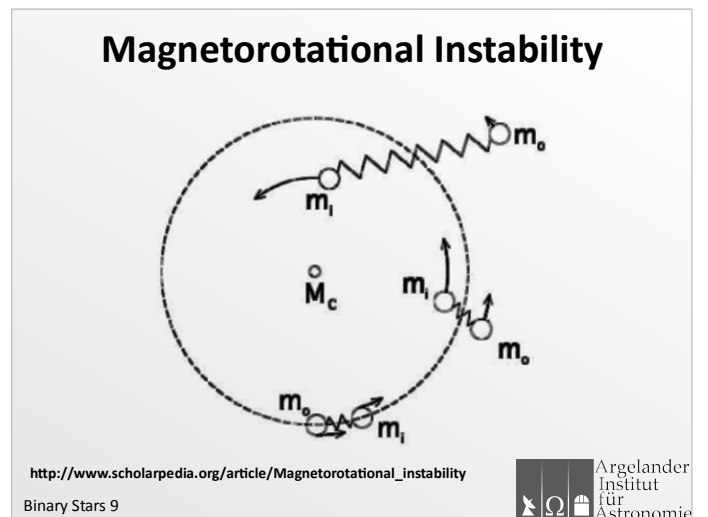
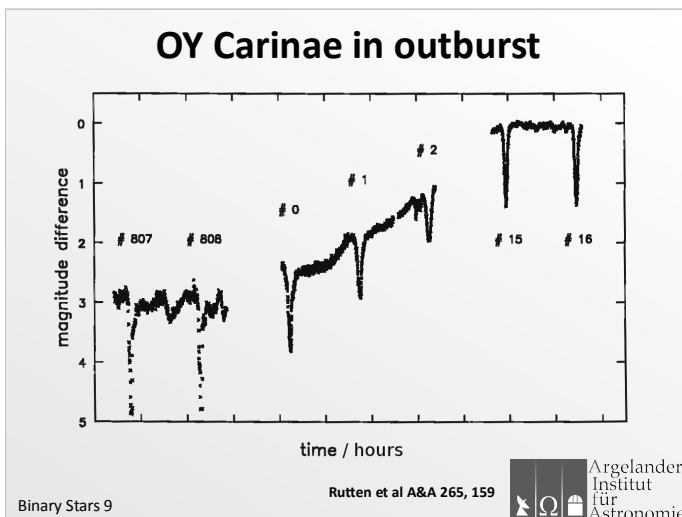
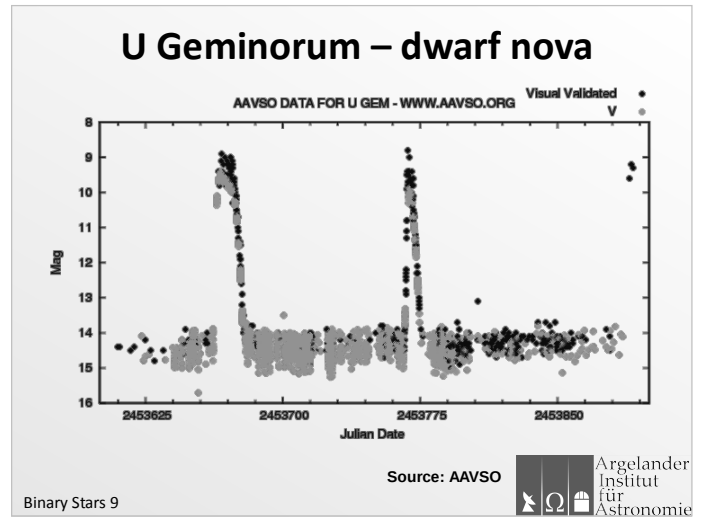
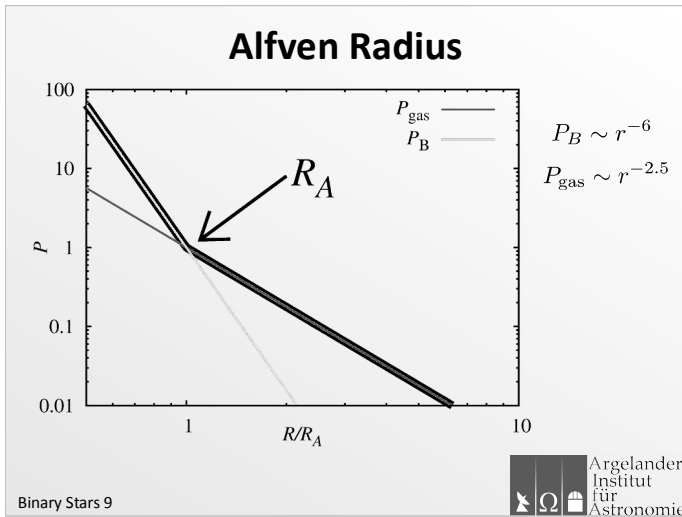
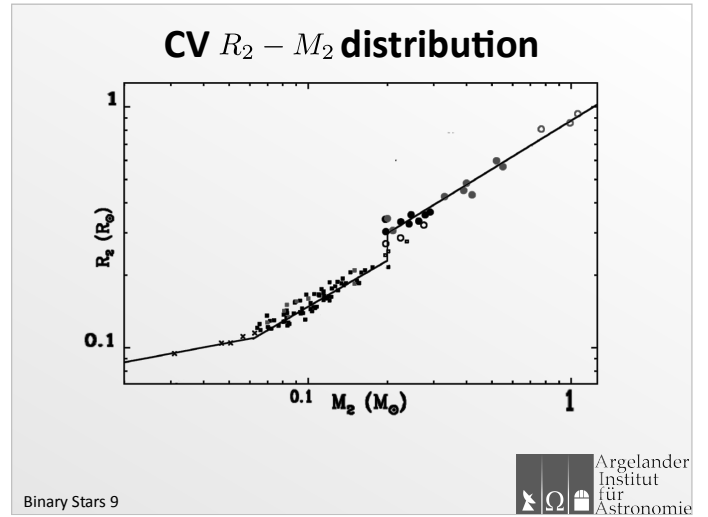
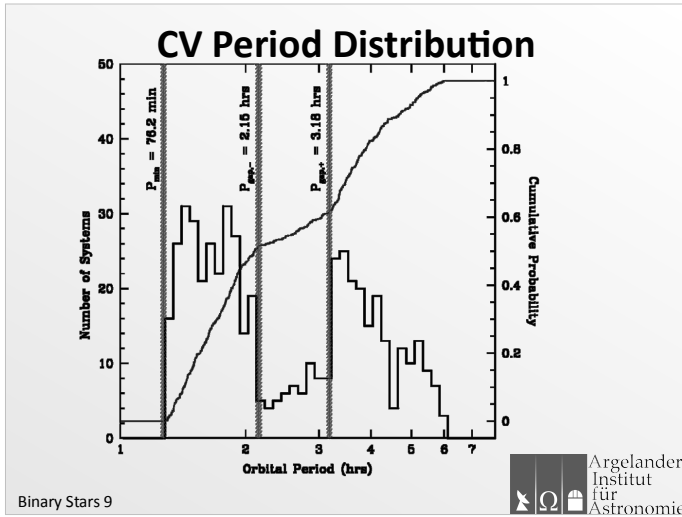
name	spectra	type	Period(d)	M_1/M_{\odot}	M_2/M_{\odot}	R_2/R_{\odot}
AM CVn	He em	ultra-compact	0.012		0.04	
OY Car	sdBe+M7-8	dwarf nova	0.063	0.685	0.07	0.127
Z Cha	sdBe+M5.5V	dwarf nova	0.075	0.84	0.125	0.17
AM Her	sdBe+M4V	magnetic polar	0.129	0.44	0.29	0.33
U Gem	sdBe+M4V	dwarf nova	0.177	1.26	0.57	0.51
DW Her	sdBe+M3V	classical nova, intermediate polar	0.194	0.60	0.40	0.49
BT Mon	sdBe+G8V	classical nova	0.334	1.04	0.87	0.89
GK Per	sdBe+K1IV	classical nova	2.00	0.9	0.5	2.5
V Sge	WN+B8	supersoft X-ray	0.514	0.9	3.3	2.1
U Sco	sdBe+F8V	supersoft X-ray	1.23	1.55	0.88	2.1

Adapted from Onno Pols' table

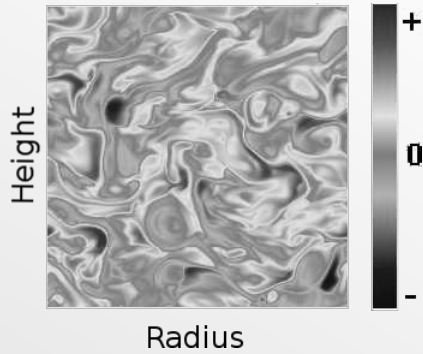


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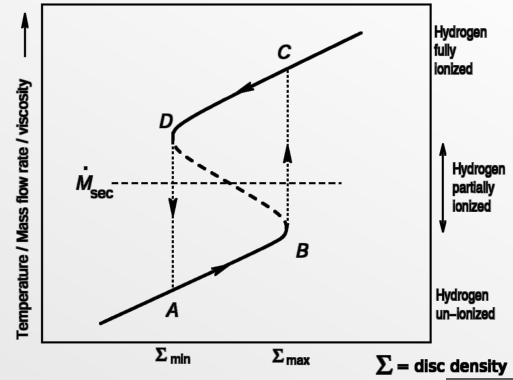


Magnetorotational Instability



http://www.scholarpedia.org/article/Magnetorotational_instability
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Thermal Instability



From Heliier's book "Cataclysmic variable stars"

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Algol and its paradox

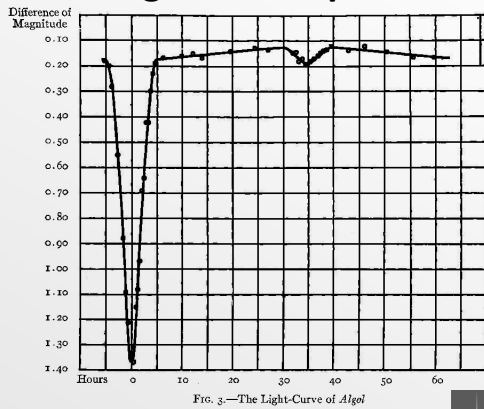
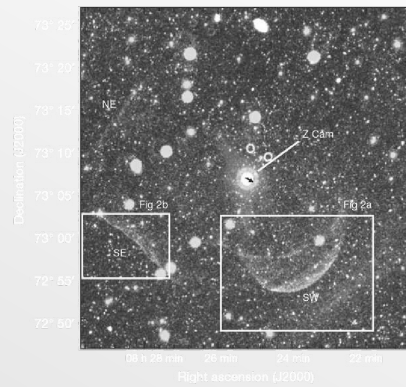


FIG. 3.—The Light-Curve of Algol

Stebbins 1911

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Classical – Dwarf Connection



Shara et al 2007
Nature 446,159

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