POLLUTED

POLLution aroUnd whiTE Dwarfs

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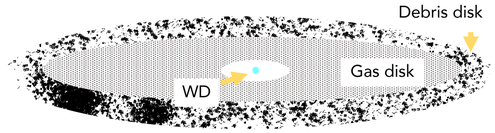
Background

At least 30% of white dwarfs (WDs) show heavy elements in their atmospheres. This "pollution" likely arises from the accretion of planetesimals that were perturbed by outer planet(s) into the white dwarf's tidal radius. A small fraction of these WDs show either emission or absorption from circumstellar (CS) gas. For WD114+017, the **photospheric abundances** have been measured and ***are similar to the bulk composition of the Earth.***

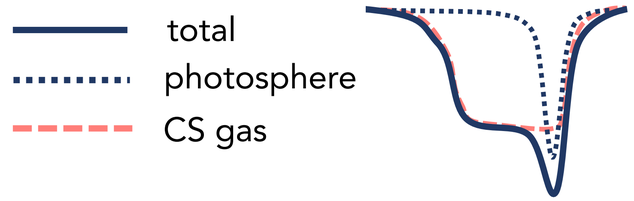
Observations

- The CS component arises from a gas disk produced through the sublimation of a transiting, disintegrating planetesimal.
- Rapid changes of circumstellar gas
- Accretion from differentiated rocky material.



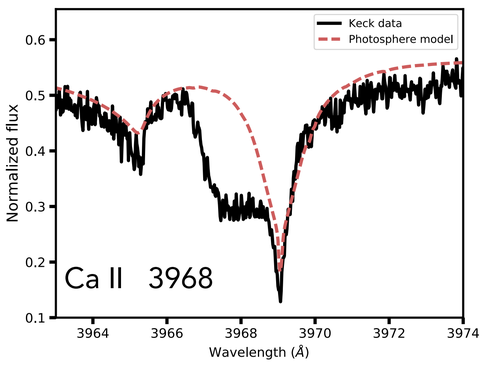
Goal of this work

Models (to date) have not yet been able to link the CS species to the total atomic abundance in gas. There is bulk motion of the gas! We aim to model the CS gas using Cloudy to better understand polluted WDs.



Examples of Polluted White Dwarfs

WD1145+017, Keck, data in black, photosphere model in red

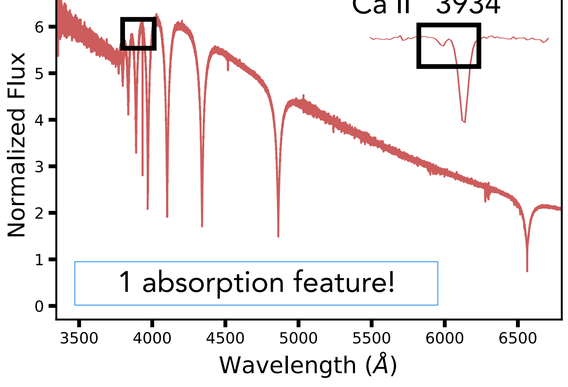


T ~ 15,000 K

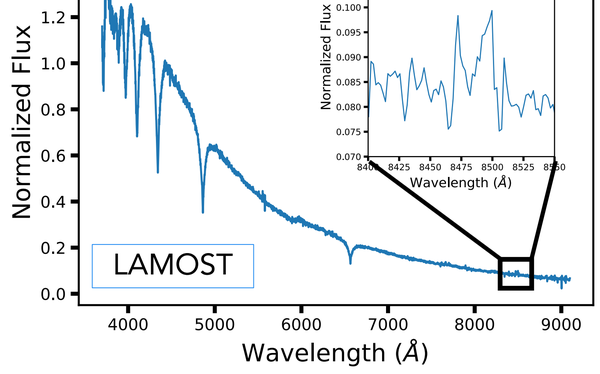
Broad absorption features

Gas in nested, eccentric, preccessing streams

MIKE, WD1124-293, T~9400 K

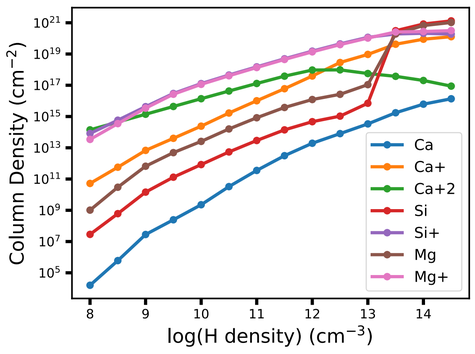


Emission at Ca triplet, T~8900 K

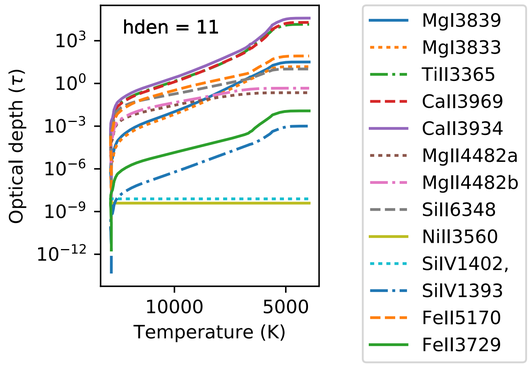


Cloudy: Predicting Polluted WD Characteristics for WD1145

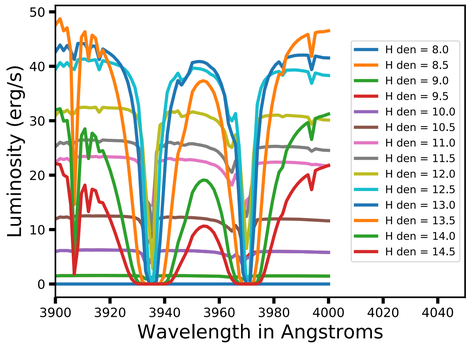
Metal species column densities for different gas masses around WD1145



Line formation with depth: See Si IV near some WDs



The Ca H and K lines for different densities around a ~15,000K BB



The Ca triplet for different densities around a ~15,000K BB.
Future Work: Need emission + absorption with velocity profile!