

‘Robust’ discussion

What efforts are underway?
What is convincingly being achieved?
Obstacles for progress?

Need completeness for light curves, accuracy for spectra

Enormous progress on **opacities**:
Many elements, I-XI spectra
at varying levels of theory
pushing towards completeness

Significant impact of different data,
but pushing towards convergence?
Comparisons important

LTE spectral analysis:

- Requires spectroscopic accuracy
- Probably not possible with theory alone
 - Combination of theory, astrophysical (stellar) data, experiments
 - Needs esp. fir IR

Non-LTE spectral analysis additionally requires:

- photoionisation/**radiative recombination (RR)+Dielectronic recombination (DR)**
- Electron impact excitation (EIE)
- Charge transfer/exchange

Experiments a crucial for benchmarking, testing, calibrating theory,
as well as for spectroscopic accuracy data

Very good theoretical calculations will be needed to
provide the identifications (labels)

Method development for theoretical calculations
(accuracy, speed,..) very important

Define Non-LTE?

Prospects for large scale calculations?

How do we know non-LTE are better
than LTE?

Kilonova discussion

What is (convincingly) established?

What are big challenges?

Lessons from supernovae?

- Merger simulations - precision modelling
 - 1% effect (ejected material)
 - Evolution to homologous phase, different components/interplay
- Nuclear physics and nucleosynthesis
 - Weak interactions, and Y_e spread
 - Physics of super heavy nuclei
- Expect diversity
 - Model outcomes, orientation
 - Complex geometry – relevant to RT

Kilonova discussion

What is (convincingly) established?

What are big challenges?

Lessons from supernovae?

- RT / spectral modelling
 - “Can KN models explain 2017gfo in detail?”
 - Critical dependence on completeness / quality of atomic data
 - Specific feature IDs
 - Sr II (He I?), Ce III, La III, Y II, Te III, Rb I
 - Evidence of range of Ye (nucleosynthesis)
 - (Non-)detection constraints/potential: Ca, Ba, Pt, Au – model dependent?
 - Uniqueness of line IDs (prospects for IDs/constraints for other species)
 - Multi-D effects matter in RT for merger simulations
 - Sphericity constraints and consistency with data
 - Tests/confidence of thermalisation
 - RT code comparison

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What is (convincingly) established?

What are big challenges?

Lessons from supernovae?

- Accuracy of blackbody match to data (2017gfo)
- Thermal continuum in GRB230307A
- Considering alternatives (differential studies) - for other scenarios for comparison
- Priorities for observation
 - Imaging, bands spectra, polarimetry....



Thanks to the organisers!



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