

**Strong liquids are more interesting than people have realized, and perhaps hold the key to understanding the "glassy state problem"**

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It has long been surmised that the extraordinary violation of the Arrhenius law, characteristic of most glassformers<sup>1</sup> as they approach their glass transition temperatures, originates in a diverging correlation length that is driving the system<sup>2-4</sup>. Whether this correlation length is purely dynamic or has roots in less easily observed structural fluctuations, is somewhat unclear. Strong liquids, it is supposed, are cases where this effect is either weak or absent. The importance of looking at the right *sort* of fluctuations is to be emphasized.

Using data from BeF<sub>2</sub> and SiO<sub>2</sub>, from a model liquid that has properties reminiscent of some metallic glassformers, and from water, we will argue that the fluctuations in strong liquids are not necessarily weak but instead have correlation lengths that are oppositely directed in temperature<sup>5</sup>, i.e. they become more pronounced as temperature *increases above* the glass temperature. In special cases they might diverge at some higher temperature liquid-liquid critical point, which will have the lambda transition form. In the behavior of intermediate liquids, then, the glass transition may not have much to do with correlation lengths at all. We reach this conclusion with the help of observations on the behavior of an interesting Non-Oxide (but also Non-Liquid) system, for which the thermodynamic character (an order-disorder transition) is *known* and understood, but which is also characterized by a strong glass transition when the ordering is arrested half way through the transition. The "big picture" for glassformers that emerges from these considerations, has strong implications for other non-oxide glasses, such as the ideally constrained chalcogenides<sup>6</sup> which prove to be "strong" liquids. It requires light scattering in silica glass fibers and pristine chalcogenide glass fibres, to decrease as the fictive temperature is lowered. Some supporting evidence, from observations on SiO<sub>2</sub> core fibres of different fictive temperatures, is provided.

## References

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