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Astrocytes encode complex behaviorally relevant information

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While it is generally accepted that neurons control complex behavior and brain computation, the role of non-neuronal cells in this context remains unclear. Astrocytes, glial cells of the central nervous system, exhibit complex forms of chemical excitation, most prominently calcium transients, evoked by local and projection neuron activity. In this talk, I will provide mechanistic links between astrocytes' spatiotemporally complex activity patterns, neuronal molecular signaling, and behavior. Using a visual detection task, in vivo calcium imaging, robust statistical analyses, and machine learning approaches, my work shows that cortical astrocytes encode the animal's decision, reward, performance level, and sensory properties. Behavioral context and motor activity-related parameters strongly impact astrocyte responses. Error analysis confirms that astrocytes carry behaviorally relevant information, supporting astrocytes' complementary role to neuronal coding beyond their established homeostatic and metabolic roles.

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