**Major Research Questions**

1. How does the cellulose synthase complex produce cellulose microfibrils?
2. What are the physicochemical interactions among cell wall components that lead to a strong network and what are the steps in their assembly?
3. How do macro-scale properties of cell walls (mechanics, porosity, thermal properties, etc.) emerge from nano-scale properties of cell wall components?

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**CLSLS Mission**

To elucidate the nm-scale structure of bio-polymer networks in plant cell walls and their means of assembly, to provide a basis for improved conversion of biomass into fuels and improved biomaterials.

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**Network structure and properties**

Genetic and enzymatic experiments determine how matrix components contribute to cell wall properties

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**Cellulose synthase (CESA) – a key protein within the CSC**

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**Probing the structure and function of the cellulose synthesis machinery**

A multi-protein cellulose synthase complex (CSC) within the plasma membrane produces cellulose fibrils

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**Cell wall architecture and dynamics**

Visualizing cellulose fibril networks and changes after physical perturbation yields new insights into cell wall dynamics

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**Spectroscopy analyzes variations in cellulose structure within cell walls**

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