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MSRI Program: Group Representation Theory and Applications

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• Character theory of finite groups.

Group algebra $\mathbb{C} \mathbf{G}$

• Character theory of finite groups.

Group algebra $\mathbb{C} \mathbf{G}$

Twisted group algebra $\mathbb{C}_{\alpha}\mathbf{G}$

• Character theory of finite groups.

 $\begin{tabular}{ll} \textbf{Group algebra} & \mathbb{C}\textbf{G} \\ & & \Downarrow \\ & \textbf{Representations} \\ \end{tabular}$

Twisted group algebra $\mathbb{C}_{\alpha}\mathbf{G}$

• Character theory of finite groups.

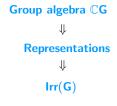
Group algebra $\mathbb{C}G$ \Downarrow Representations

Twisted group algebra $\mathbb{C}_{\alpha}\mathbf{G}$ \Downarrow Projective representations

• Character theory of finite groups.

 $\begin{tabular}{ll} \textbf{Group algebra} & \mathbb{C}\textbf{G} \\ & & \Downarrow \\ & \textbf{Representations} \\ & & \Downarrow \\ & \textbf{Irr}(\textbf{G}) \\ \end{tabular}$

Twisted group algebra $\mathbb{C}_{\alpha}\mathbf{G}$ \Downarrow Projective representations



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Twisted group algebra \mathbb{C}_{\alpha}\mathbf{G} \Downarrow Projective representations \Downarrow \mathbf{Irr}(\mathbf{G}\mid\theta)
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Group algebra ℂG

↓

Representations

↓

Irr(G)

↓

p-blocks
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Twisted group algebra \mathbb{C}_{\alpha}\mathbf{G} \Downarrow Projective representations \Downarrow \mathbf{Irr}(\mathbf{G}\mid\theta)
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Group algebra ℂG

↓

Representations

↓

Irr(G)

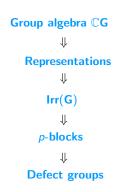
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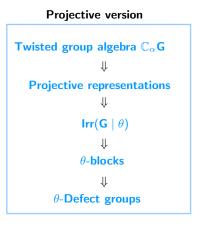
p-blocks

↓

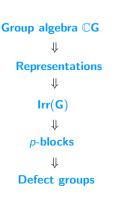
Defect groups
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Twisted group algebra \mathbb{C}_{\alpha}\mathbf{G} \Downarrow Projective representations \Downarrow \mathbf{Irr}(\mathbf{G}\mid\theta) \Downarrow \theta\text{-blocks}
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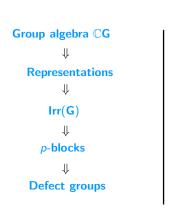
• Character theory of finite groups.

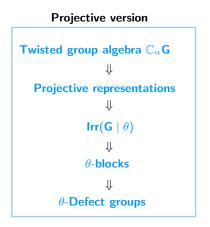


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Projective version
Twisted group algebra \mathbb{C}_{\alpha}\mathbf{G}
   Projective representations
                 Irr(G \mid \theta)
                 \theta-blocks
          \theta-Defect groups
```

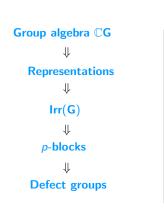
Why?

• Character theory of finite groups.





• Why? Reduction of some problems (e.g McKay conjecture).



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Projective version
Twisted group algebra \mathbb{C}_{\alpha}\mathbf{G}
   Projective representations
                 Irr(G \mid \theta)
                \theta-blocks
         \theta-Defect groups
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- Why? Reduction of some problems (e.g McKay conjecture).
- **Question:** Can θ -blocks help to reduce other conjectures?