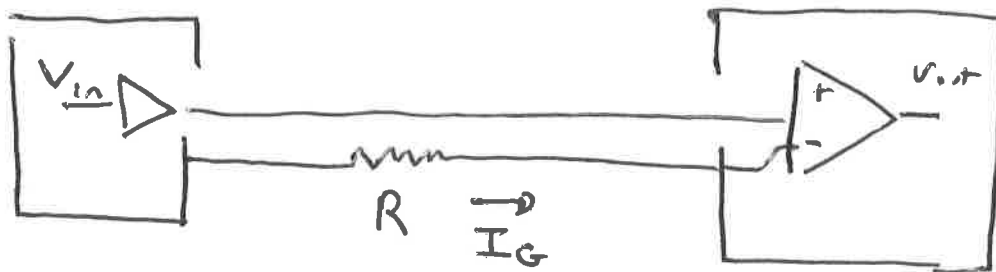
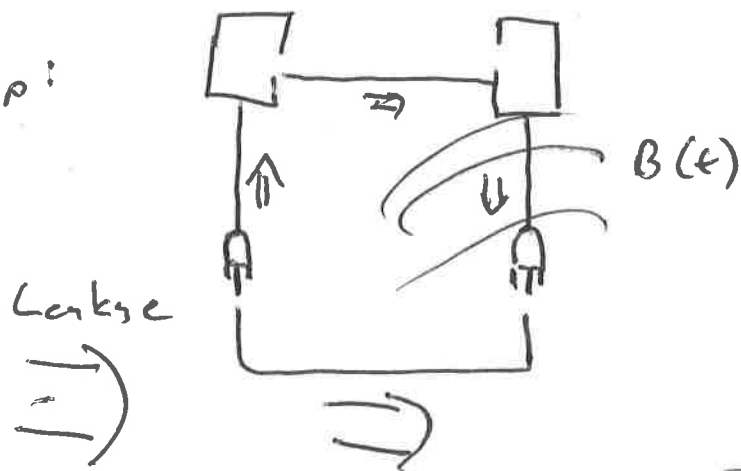


# Ground Loops



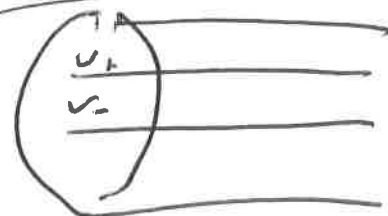
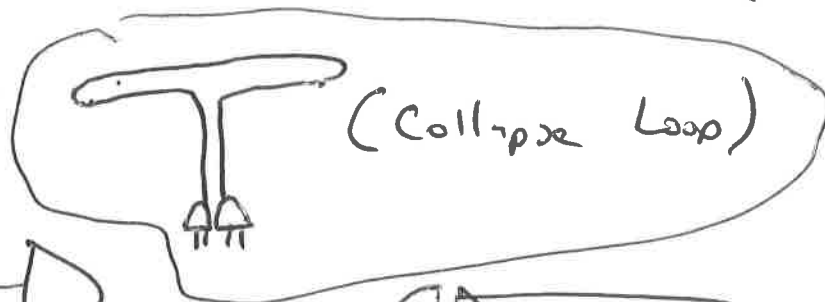
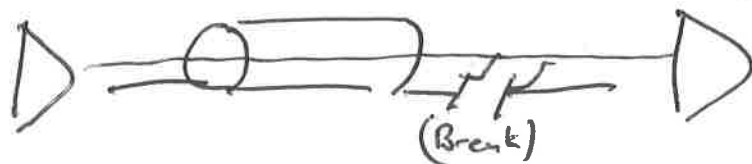
Noise at  $V_{out}$  due to  $I_G$

Loop:

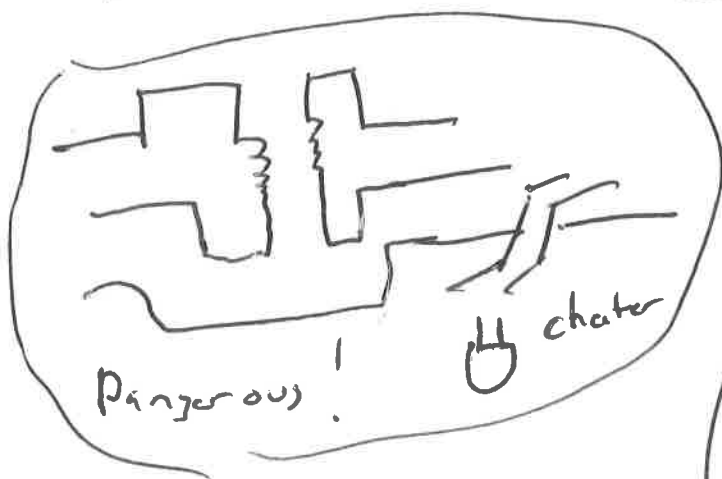


\* Inherent conflict between safety and reducing electrical noise

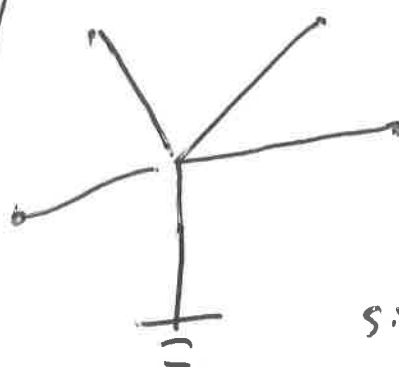
Break the Loop:



Differential Signals



Ground Distribution



single point

## Modern Experiments

- Differential Signals, Optical Signals
- Careful Ground Distribution (Committees!):

