



# PHYSICS AND ASTRONOMY COLLOQUIUM

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## **“Limiting global warming to 2 °C and the physics behind cumulative carbon emissions budgets”**

### Abstract

The Paris Agreement committed ratifying parties to limit global warming to well below 2 °C. The last report of the UN Intergovernmental Panel on Climate Change assessed that warming driven by carbon dioxide, the dominant driver of global warming, is closely proportional to the total cumulative emissions of CO<sub>2</sub>, and therefore that limiting warming to a threshold such as 2 °C implies a fixed budget of cumulative CO<sub>2</sub> emissions, which must not be exceeded if warming is to remain below this threshold. Such cumulative emissions budgets are potentially useful climate mitigation policy tools. But why should global warming be proportional to cumulative CO<sub>2</sub> emissions? CO<sub>2</sub> emitted into the atmosphere is taken up over time by plants and soils on land and by the ocean; an increase in atmospheric CO<sub>2</sub> concentration in the atmosphere affects its radiative balance in a nonlinear way; and Earth's surface temperature responds to the resulting radiative imbalance over time as heat is drawn into the ocean. In this talk I will discuss this proportionality, its implications, and the physical hypotheses put forward to explain it.

Wednesday, March 21, 2018

3:30 p.m.

BWC - Room A104