Journée au vert — Polaris

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Zeroth-order convex optimization in MIMO systems

- **MIMO multiple-access-channel:**
  - wireless network with
    - $K$ users with $M_k$ antennas
    - one receiver with $N$ antennas
  - vector multiple access channel (MAC):
    \[
    y = \sum_{k=1}^{K} H_k x_k + z
    \]
- **Goal:** maximize the users’ achievable total transmission rate
  \[
  R(Q_1, \ldots, Q_K) = \log \det \left( \mathbf{I} + \sum_{k=1}^{K} H_k Q_k H_k^\dagger \right) \quad \text{(Shannon-H.)}
  \]
  where $Q_k = \mathbb{E}[x_k x_k^\dagger]$, s.t. power consumption constraints.
- **Zero-th order feedback:** measurements of transmission rates $R(Q)$ rather than full gradients $\nabla R(Q)$. 
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