

---

# Energy Efficient Scheduling for Data Centers

Zrinka Puljiz, Prof. Constantine Caramanis and Prof. Sanjay Shakkottai

---

- Data centers large power consumers
  - Find a scheduling policy that **minimizes the energy consumption** in a nontrivial way.

- Cost function:
  - Running cost, switching cost and queueing cost

$$C(n, T) = c_R \int_0^T S(t) dt + c_Q \int_0^T \sum_{i=1}^n Q_i(t) dt + c_S \int_0^T \sum_{i=1}^n \delta(1 - I_i(t)) dt.$$

- Every stable policy has a lower limit

$$\lim_{n \rightarrow \infty} \lim_{T \rightarrow \infty} \frac{C(n, T)}{nT} \geq c_R \lambda$$

- DSO policy achieves the lower limit

$$\lim_{n \rightarrow \infty} \lim_{T \rightarrow \infty} \frac{C_{\text{DSO}}(n, T)}{nT} = c_R \lambda$$

- **Dynamic Switch-Off (DSO) policy:**

- Join a server that finished processing most recently
- If the server is idle for  $\delta$  time it gets switched “OFF”