



**Fakultät für Ingenieurwissenschaften, Informatik und Psychologie**

## **Informatik-Fachvortrag**

**Montag, den 22. Juni 2026, 10:30 Uhr**

Universität Ulm, Oberer Eselsberg  
Gebäude O27, Raum 531

**Herr Dr. Pranjal Dutta**

School of Computing and Data Science (CCDS)

spricht zum Thema

### **Finding Equal Subset Sums in the Pigeonhole Regime**

The Pigeonhole Equal Subset Sum problem (PESS), introduced by Papadimitriou (1994), asks: given  $n$  positive integers bounded by  $M$  with total sum less than  $2^n - 1$ , find two distinct subsets with the same sum. A solution is guaranteed by the pigeonhole principle, yet finding one efficiently has been a longstanding challenge.

In this talk, I will introduce the problem and discuss its connections to Subset Sum, Equal Subset Sum, and total search problems. First, I will describe a simple birthday-paradox-based algorithm for the weak-pigeonhole regime, and explain how combining it with Karmarkar–Karp differencing yields faster algorithms for dense instances. Second, I will discuss a deterministic  $\text{poly}(n) \cdot M^{o(1)}$ -time algorithm when  $M = 2^{o(n)}$ , based on block merging and modular pruning. I will also discuss a conditional lower bound from lattice problems, as well as an average-case  $\text{poly}(n) \cdot M^{1/4}$ -time algorithm. This beats the best known algorithm which runs in  $\text{poly}(n) \cdot M^{1/3}$  time (Jin-Wu, ICALP 2024, Jin-Williams-Zhang, ESA 2025).

Based on two submitted papers jointly written with Deepak Bhati, Antoine Joux, Mahesh Sreekumar Rajasree, and Karol Węgrzycki (from MPI/CISPA Germany).

Es laden ein die Dozenten der Fakultät für Ingenieurwissenschaften, Informatik und Psychologie.

Ulm, den 03.06.2026

gez. Prof. Dr. Jacobo Torán