

Mathematics Colloquium

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# Iterated Antiderivative Extensions

*Abstract: Let  $F$  be a differential field with an algebraically closed field of constants and let  $E$  be a differential field extension of  $F$  with no new constants. We say  $E$  is an Iterated Antiderivative Extension of  $F$ , abbreviated IAE, if there is a tower of differential fields  $F = F_0 \subset F_1 \subset \cdots \subset F_n = E$  such that for  $i = 1, 2, \dots, n$ ,  $F_i = F_{i-1}(x_i)$  and  $x_i \in E$  is an antiderivative of  $F_{i-1}$ . In this talk, we will show that if  $E$  is an IAE of  $F$  and  $K$  is a differential subfield of  $E$  such that  $K \supseteq F$ , then  $K$  is an IAE of  $F$  as well. The iterated extension generated by all iterated logarithms  $\mathbb{C}(\Lambda_\infty)$  closed at each stage by translation automorphisms is an (infinite) IAE of the field of complex numbers with trivial derivation. We will compute the finitely differentially generated subfields of  $\mathbb{C}(\Lambda_\infty)$ .*

**Wednesday, September 16**

**4:00-5:00 pm**  
**204 Smith Hall**