

# Observational signatures of dark photons from supernovae

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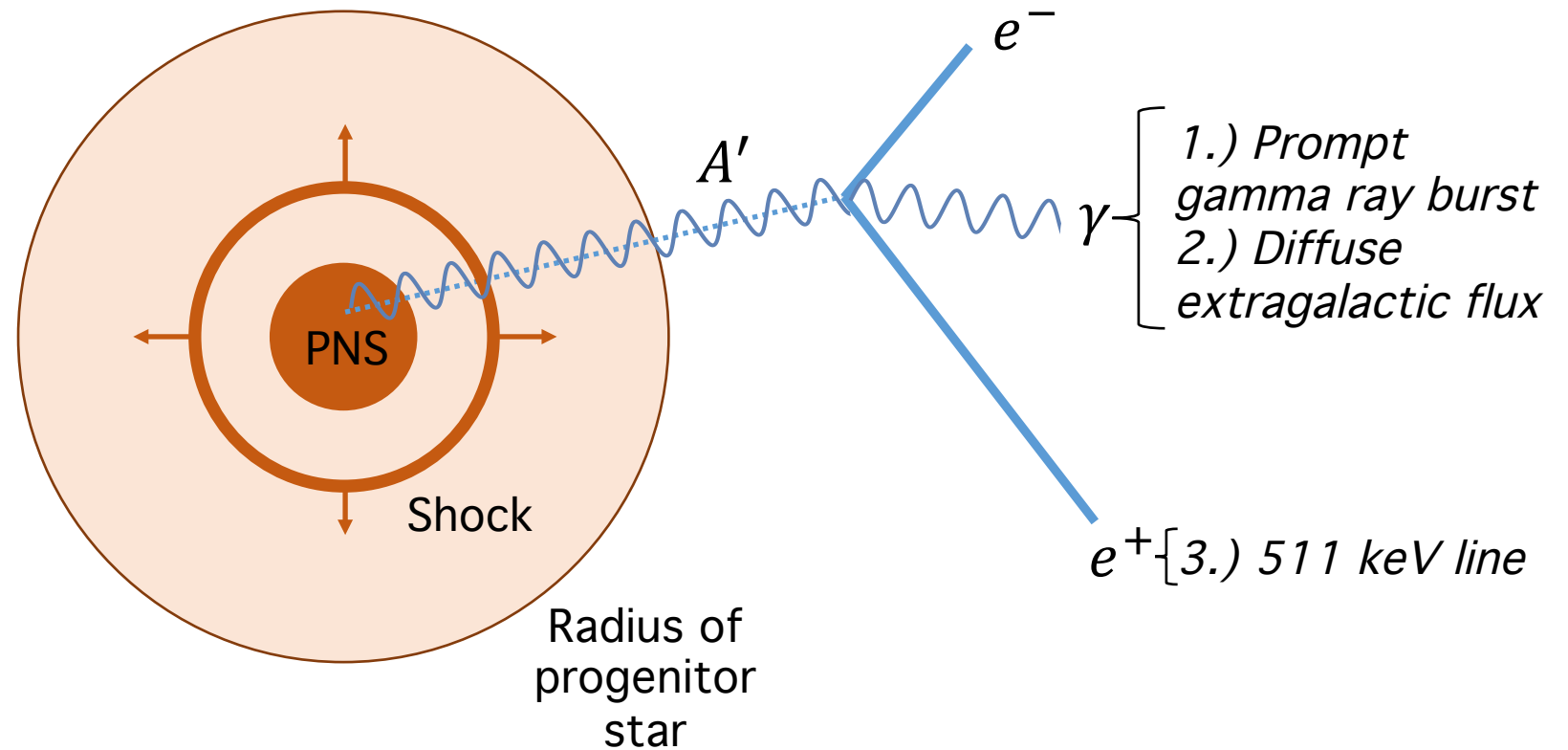
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<https://arxiv.org/abs/1901.08596>

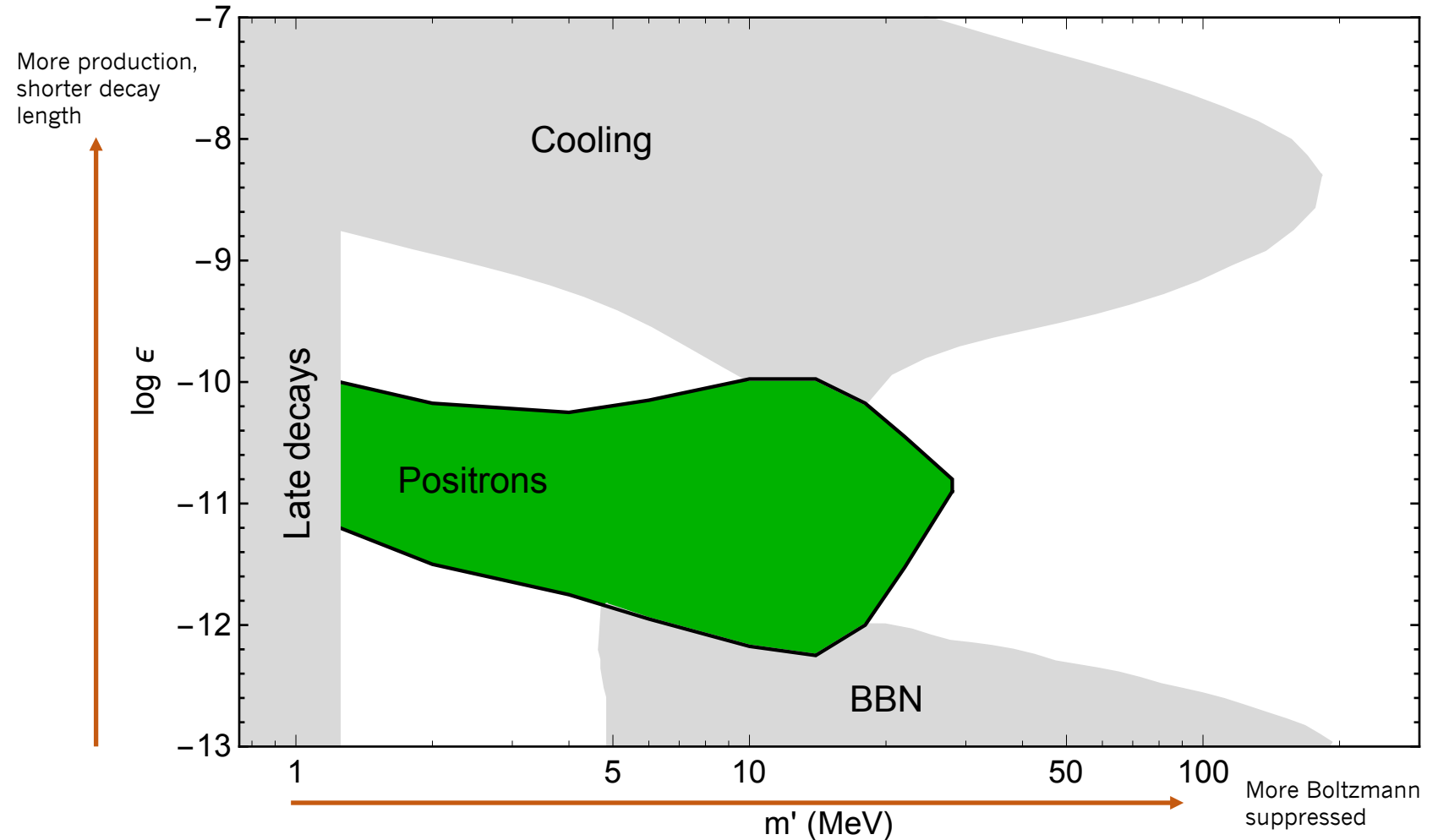
# Introduction

- **Even below cooling bound, supernovae produce many dark photons**
- Decay products are observable!



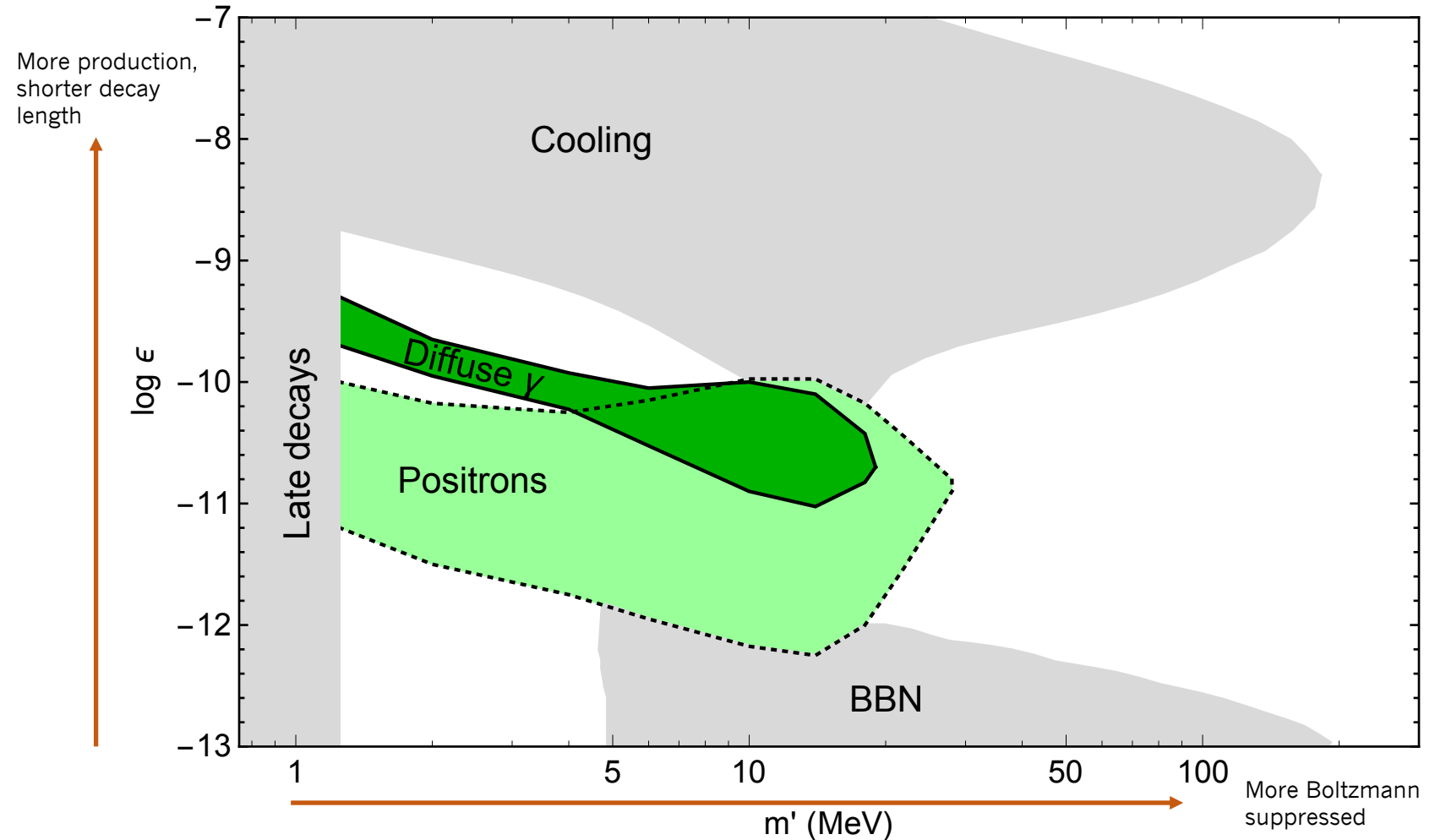
# Signature #1: Positron annihilation

- Positrons slow and annihilate in galaxy
- Constrained by INTEGRAL measurement of 511 keV line



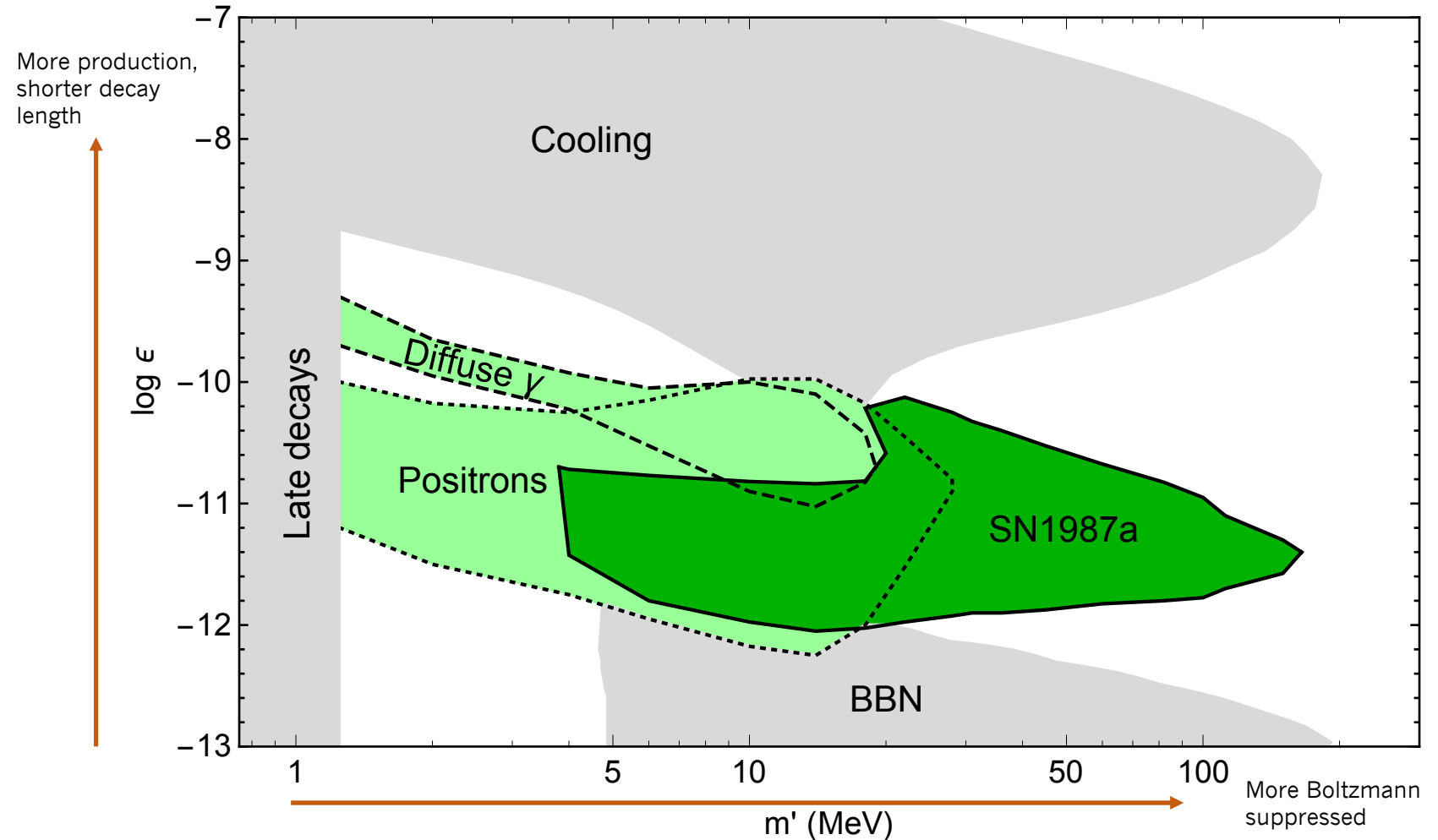
# Signature #2: Diffuse extragalactic gamma rays

- Decay products can form  $e^+e^-$  plasma (“**fireball**”)
- Diffuse extragalactic flux of gamma rays measured by SMM



# Signature #3: Prompt gamma rays

- SN1987a gamma ray emission constrained by GRS
- Discovery potential (next galactic supernova)



# Results

- Observations place strong constraints well below cooling
- **Future observations have discovery potential!**

