Rapid proton capture process in type I X-ray bursts generated in LMXBs with the effects of nuclear masses

Master's Thesis, 2.9.2025

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Abstract

Voutilainen, Antero
Rapid proton capture process in type I X-ray bursts generated in LMXBs with the effects of nuclear masses
Master's thesis
Department of Physics, University of Jyväskylä, 2025, 15 pages.

Keywords: Thesis, abstract, writing, instructions

Tiivistelmä

Voutilainen, Antero
Rapid proton capture process in type I X-ray bursts generated in LMXBs with the effects of nuclear masses
Pro gradu -tutkielma
Fysiikan laitos, Jyväskylän yliopisto, 2025, 15 sivua

Avainsanat: Opinnäyte, tiivistelmä, kirjoittaminen, ohjeet

Preface

Jyväskylä January 1, 2020

Olli Opiskelija

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1 Introduction

2 Theoretical background

2.1 Low Mass X-ray Binaries

2.1.1 Nuclear reaction network

2.1.2 Rapid Proton Capture Process

2.1.3 Total Reaction Rate

Total reaction rate:

$$\begin{aligned} N_A\langle\sigma v\rangle_{total} = &\sum_i N_A\langle\sigma v\rangle^i_{narrow\,resonances} \\ &+ \sum_k N_A\langle\sigma v\rangle^k_{broad\,resonances} \\ &+ N_A\langle\sigma v\rangle_{non\,resonant} \\ &+ N_A\langle\sigma v\rangle_{continuum} \end{aligned} \tag{1}$$

2.1.4 Light Emission Curves

2.2 TALYS

2.2.1 Hauser-Feshbach statistical model

2.2.2 Parameters

2.3 Winnet

3 Methods and materials

3.1 Nuclear masses measured at IGISOL

3.2 Usage of TALYS

3.3 Usage of Winnet

3.4 Simulation of Light Curves

4 Results

4.1 Simulated Light Curves

5 Conclusions

A First appendix

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B Second appendix

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