On estimation of the optical thickness in solar prominences

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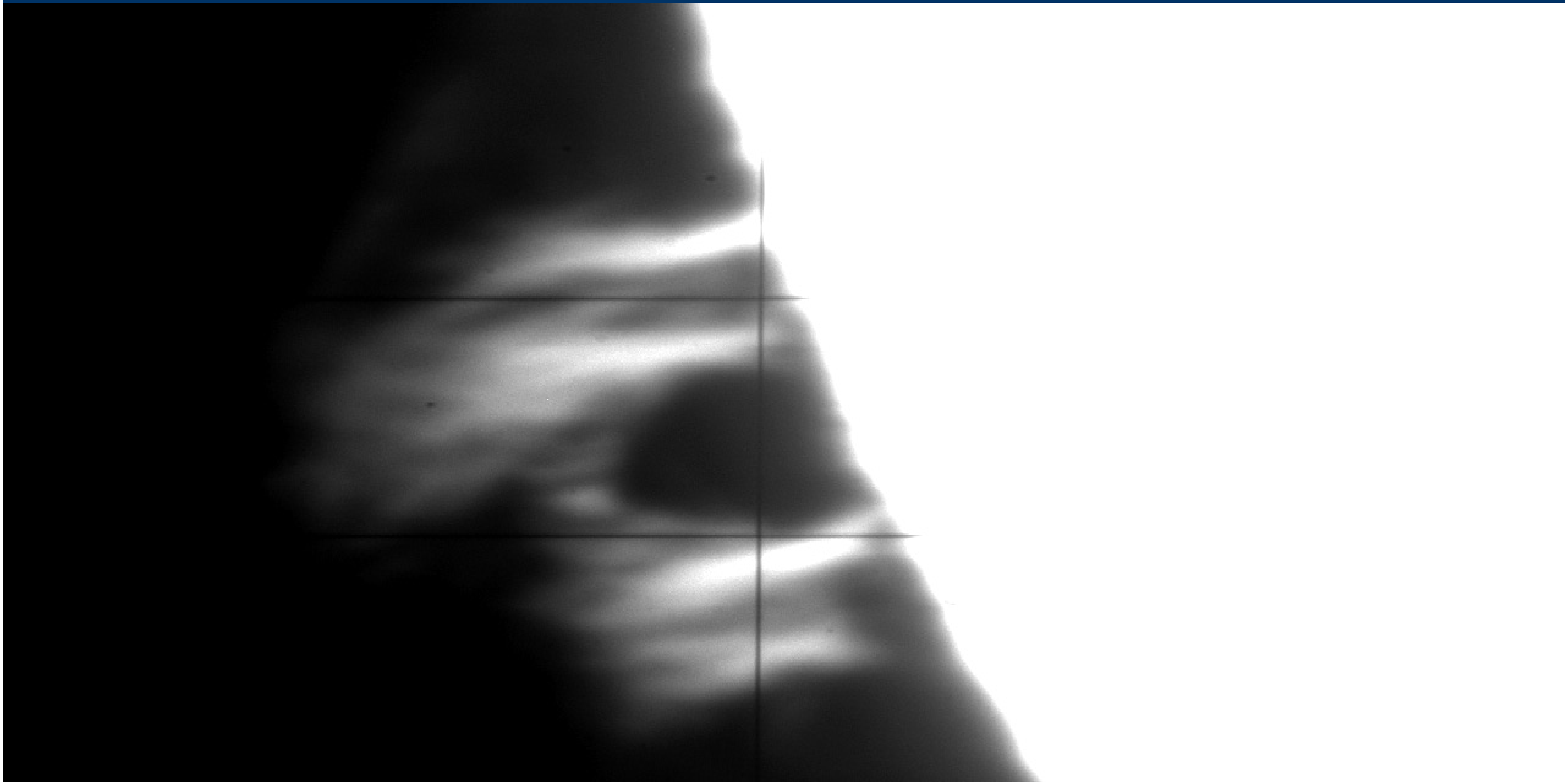
Introduction

- Correlation between the opacity of a prominence and its absorption in UV
- Fast and reliable method to estimate the opacity of prominences was needed
- Method should deal with non-calibrated images



Method

- Profile of Hα emission line of a prominence, with some approximations can be represented with function:

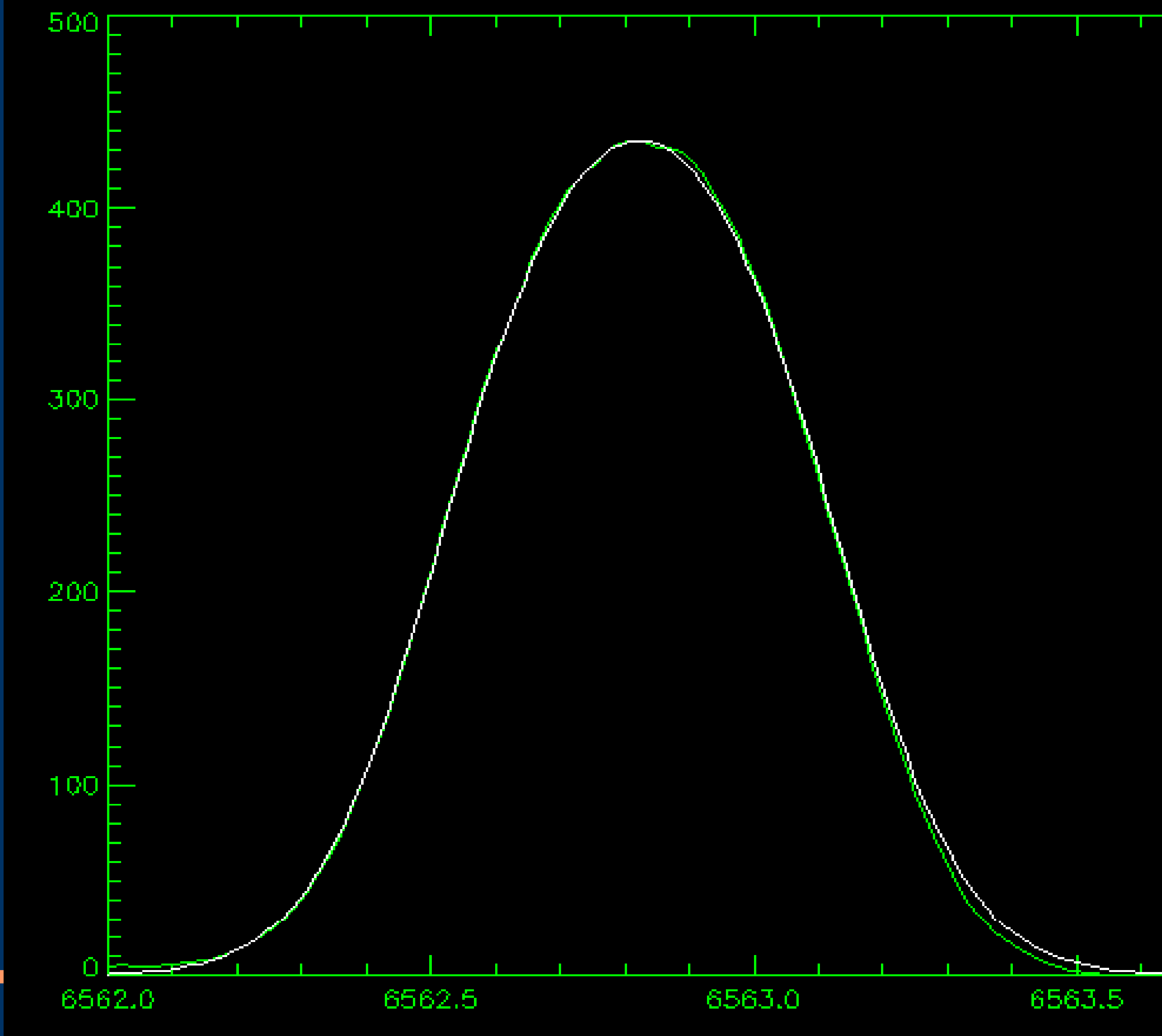
$$I_\lambda = S\left(1 - e^{\tau_0 \cdot e^{-\frac{(\lambda - \lambda_{max})^2}{\Delta\lambda_d^2}}}\right)$$

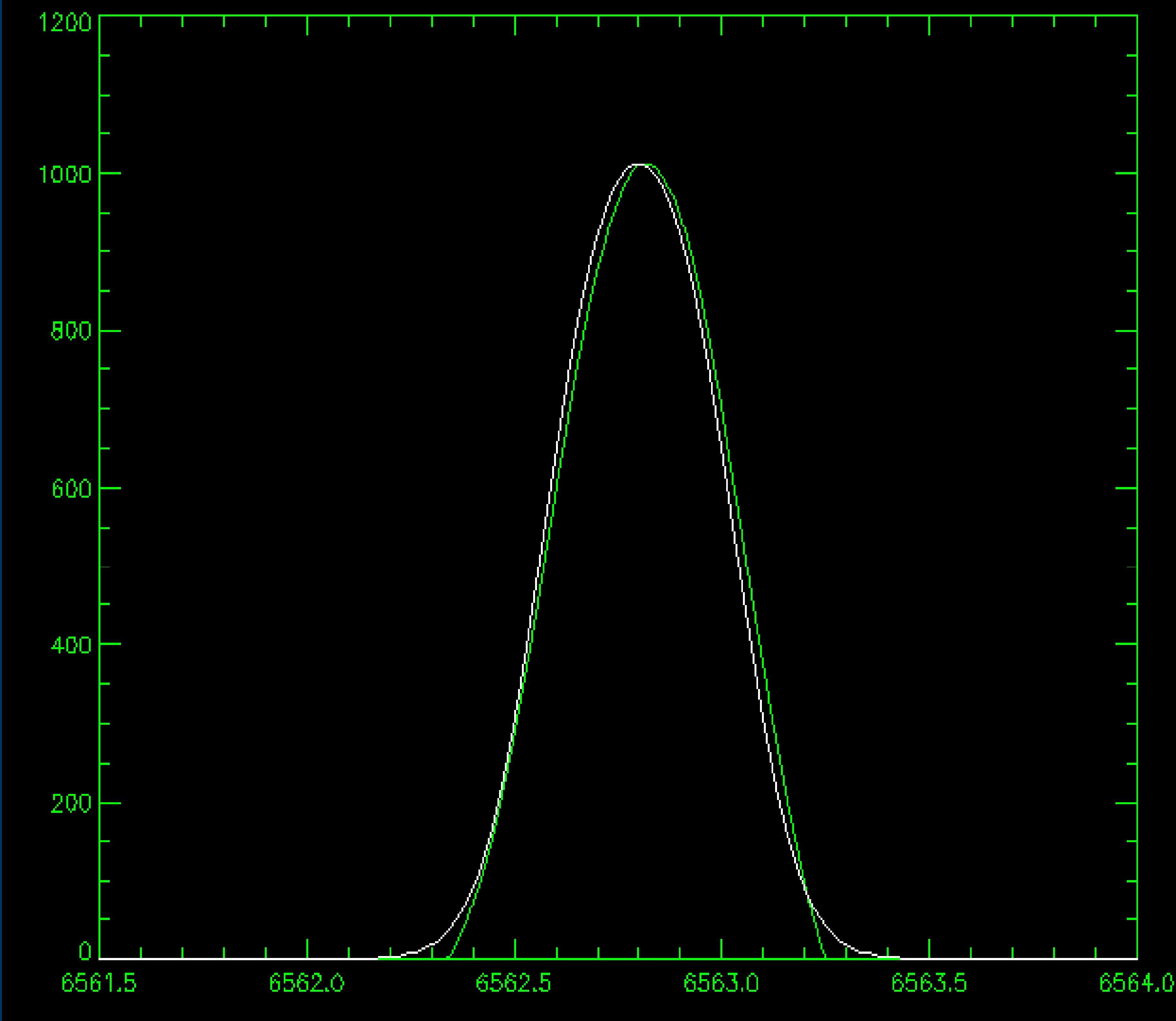
Method

- Aim was to fit the observed profile with this function
- Problem: Source function and optical thickness are not independent
- Solution: Use following iterative method

Method

- Assume some starting optical thickness
- Calculate S from the maximum of observed profile
- Among certain number of values for τ, find one which fits best to our observed profile
- Make that value of τ new value of optical thickness
- Repeat process until convergence

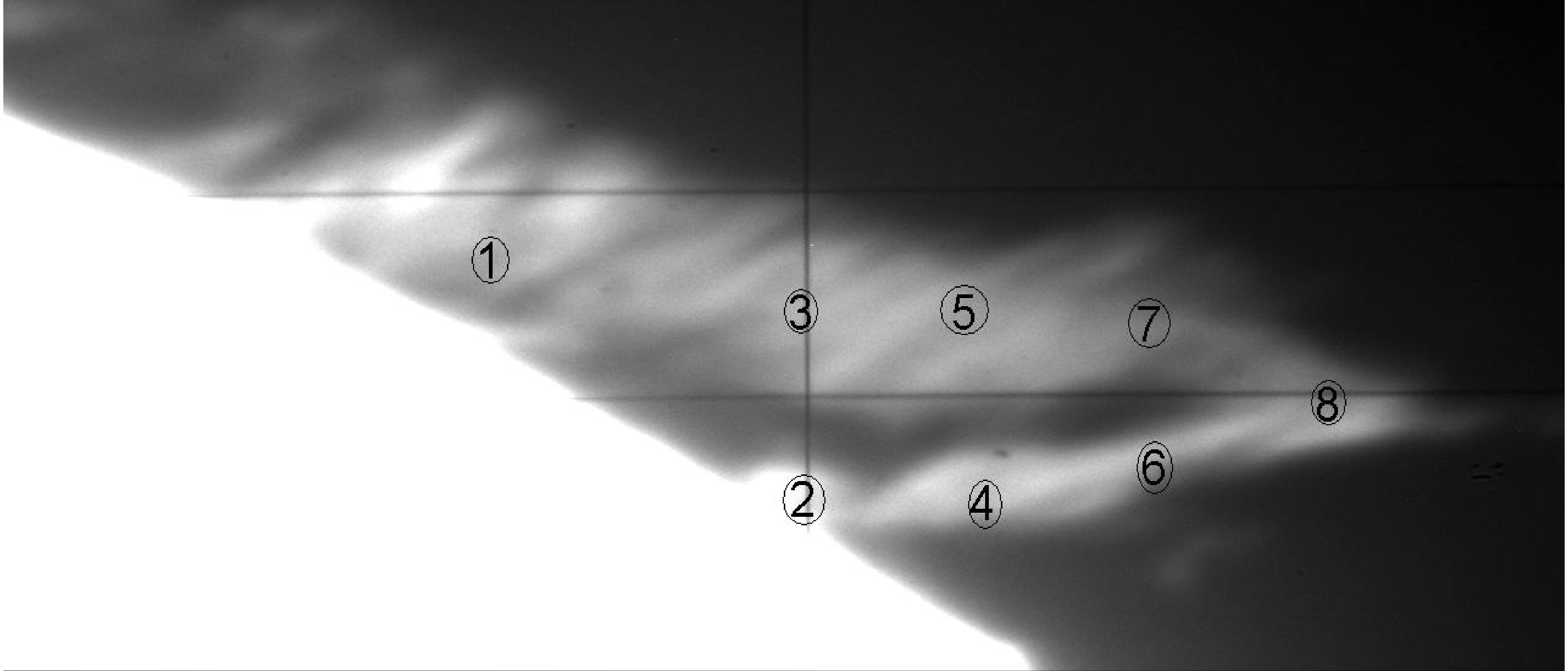

500
400
300
200
100
0
6562.0
6562.5
6563.0
6563.5



1200
1000
800
600
400
200
0
6561.5
6562.0
6562.5
6563.0
6563.5
6564.0

Results

- 52 processed prominences, 188 line profiles
- Optical thickness goes between **0,97 and 1,57**
- In one prominence, optical thickness measured in different spots rarely varies more then **0,3.**



Point No.	1	2	3	4	5	6	7	8
τ_0	1,27	1,34	1,24	1,20	1,33	1,37	1,23	1,27

Conclusions and discussion

Thank you all ! ! !