Lima FitGaussian Specific device Documentation

1. General Purpose

The **FitGaussian** Lima specific device is designed to

1. Automatically extract Regions of Interest (ROIs) from acquired image
2. Computing the horizontal and vertical profiles
3. Fit these profiles using a Gaussian model
4. Providing Tango attributes describing the Center, Magnitude, Sigma, FWHM, ... of the beam.

2. Overall Architecture

The project is based on four main classes:

- **FitGaussian**: Main Tango class that orchestrates processing and publishes results.
- **FitTask**: Image processing unit that coordinates ROI detection and Gaussian fits.
- **AutoROI**: Automatically detects the region of interest from the image intensity distribution.
- **FitGaussLM**: Implements the Levenberg–Marquardt algorithm to fit Gaussian profiles.

3. Processing Pipeline

1. Image acquisition from camera through Lima
2. Automatic ROI detection (*AutoROI*)
3. Extraction of horizontal and vertical projections (*FitTask*)
4. Gaussian fitting of profiles using *FitGaussLM*
5. Publishing results to the Tango server (*FitGaussian*)

4. Code Organization

File	Description
AutoROI.h / .cpp	Automatic ROI detection
FitGaussLM.h / .cpp	Gaussian fitting algorithm (Levenberg–Marquardt)
FitTask.h / .cpp	Coordinates processing, stores spectra and ROIs
FitGaussian.h / .cpp	Tango interface and overall orchestration